SAMSUNG

MICROWAVE OVEN

CO88R

SERVICE Manual

MICROWAVE OVEN

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BWT

PRECAUTIONS TO BE OBSERVED BEFORE AND DURING SERVICING TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY

(a) Do not operate or allow the oven to be operated with the door open.
(b) Make the following safety checks on all ovens to be serviced before activating the magnetron or other microwave source, and make repairs as necessary:
(1) Interlock operation,
(2) proper door closing,
(3) seal and sealing surfaces (arcing, wear, and other damage),
(4) damage to or loosening of hinges and latches,
(5) evidence of dropping or abuse.
(c) Before turning on microwave power for any service test or inspection within the microwave generating compartments, check the magnetron, wave guide or transmission line, and cavity for proper alignment, integrity, and connections.
(d) Any defective or misadjusted components in the interlock, monitor, door seal, and microwave generation and transmission systems shall be repaired, replaced, or adjusted by procedures described in this manual before the oven is released to the owner.
(e) A Microwave leakage check to verify compliance with the Federal performance standard should be performed on each oven prior to release to the owner.

1. Precaution

Follow these special safety precautions. Although the microwave oven is completely safe during ordinary use, repair work can be extremely hazardous due to possible exposure to microwave radiation, as well as potentially lethal high voltages and currents.

1-1 Safety precautions (⚠)

1. All repairs should be done in accordance with the procedures described in this manual. This product complies with Federal Performance Standard 21 CFR Subchapter J (DHHS).

2. Microwave emission check should be performed to prior to servicing if the oven is operative.

3. If the oven operates with the door open : Instruct the user not to operate the oven and contact the manufacturer and the center for devices and radiological health immediatly.

4. Notify the Central Service Center if the microwave leakage exceeds 5 mW/cm^2

5. Check all grounds.

6. Do not power the MWO from a "2-prong" AC cord. Be sure that all of the built-in protective devices are replaced. Restore any missing protective shields.

7. When reinstalling the chassis and its assemblies, be sure to restore all protective devices, including: nonmetallic control knobs and compartment covers.

8. Make sure that there are no cabinet openings through which people--particularly children--might insert objects and contact dangerous voltages. Examples: Lamp hole, ventilation slots.

9. Inform the manufacturer of any oven found to have emmission in excess of 5 mW/cm^2, Make repairs to bring the unit into compliance at no cost to owner and try to determine cause.
   Instruct owner not to use oven until it has been brought into compliance.

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10. Service technicians should remove their watches while repairing an MWO.
11. To avoid any possible radiation hazard, replace parts in accordance with the wiring diagram. Also, use only the exact replacements for the following parts: Primary and secondary interlock switches, interlock monitor switch.
12. If the fuse is blown by the Interlock Monitor Switch: Replace all of the following at the same time: Primary and secondary switches, as well as the Interlock Monitor Switch. The correct adjustment of these switches is described elsewhere in this manual. Make sure that the fuse has the correct rating for the particular model being repaired.

13. Design Alteration Warning:
    Use exact replacement parts only, i.e., only those that are specified in the drawings and parts lists of this manual. This is especially important for the Interlock switches, described above. Never alter or add to the mechanical or electrical design of the MWO. Any design changes or additions will void the manufacturer's warranty.10.Always unplug the unit's AC power cord from the AC power source before attempting to remove or reinstall any component or assembly.

1-2 Special Servicing Precautions (Continued)

14. Never defeat any of the B+ voltage interlocks. Do not apply AC power to the unit (or any of its assemblies) unless all solid-state heat sinks are correctly installed.

15. Some semiconductor ("solid state") devices are easily damaged by static electricity. Such components are called Electrostatically Sensitive Devices (ESDs). Examples include integrated circuits and field-effect transistors.

    Immediately before handling any semiconductor components or assemblies, drain the electrostatic charge from your body by touching a known earth ground.

16. Always connect a test instrument's ground lead to the instrument chassis ground *before* connecting the positive lead; always remove the instrument's ground lead last.

17. When checking the continuity of the switches or transformer, always make sure that the power is OFF, and one of the lead wires is disconnected.

18. Components that are critical for safety are indicated in the circuit diagram by shading, ⚠ or ⚠ .

19. Use replacement components that have the same ratings, especially for flame resistance and dielectric strength specifications. A replacement part that does not have the same safety characteristics as the original might create shock, fire or other hazards.

1-3 Special High Voltage Precautions

1. High Voltage Warning
   Do not attempt to measureany of the high voltages--this includes the filament voltage of the magnetron. High voltage is present during any cook cycle.

   Before touching any components or wiring, always unplug the oven and discharge the high voltage capacitor (See Figure 1-1)

2. The high-voltage capacitor remains charged for about 30 seconds after disconnection. Short the negative terminal of the high-voltage capacitor to to the oven chassis. (Use a screwdriver.)

3. High voltage is maintained within specified limits by close-tolerance, safety-related components and adjustments. If the high voltage exceeds the specified limits, check each of the special components.

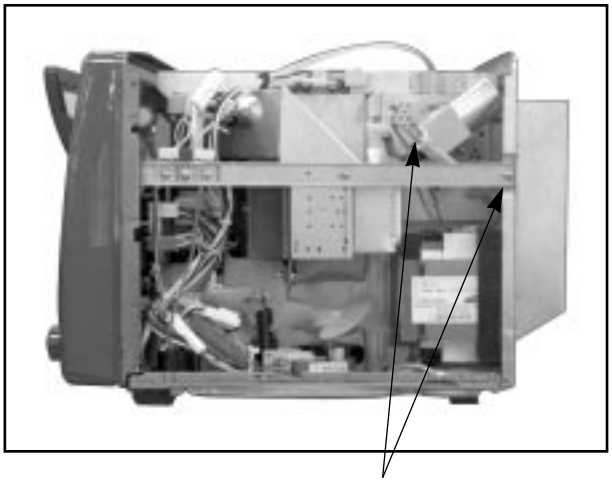


Fig. 1-1 Touch chassis side first then short to the high voltage capacitor terminal by using a scredriver or jumper wire.

2. Specifications

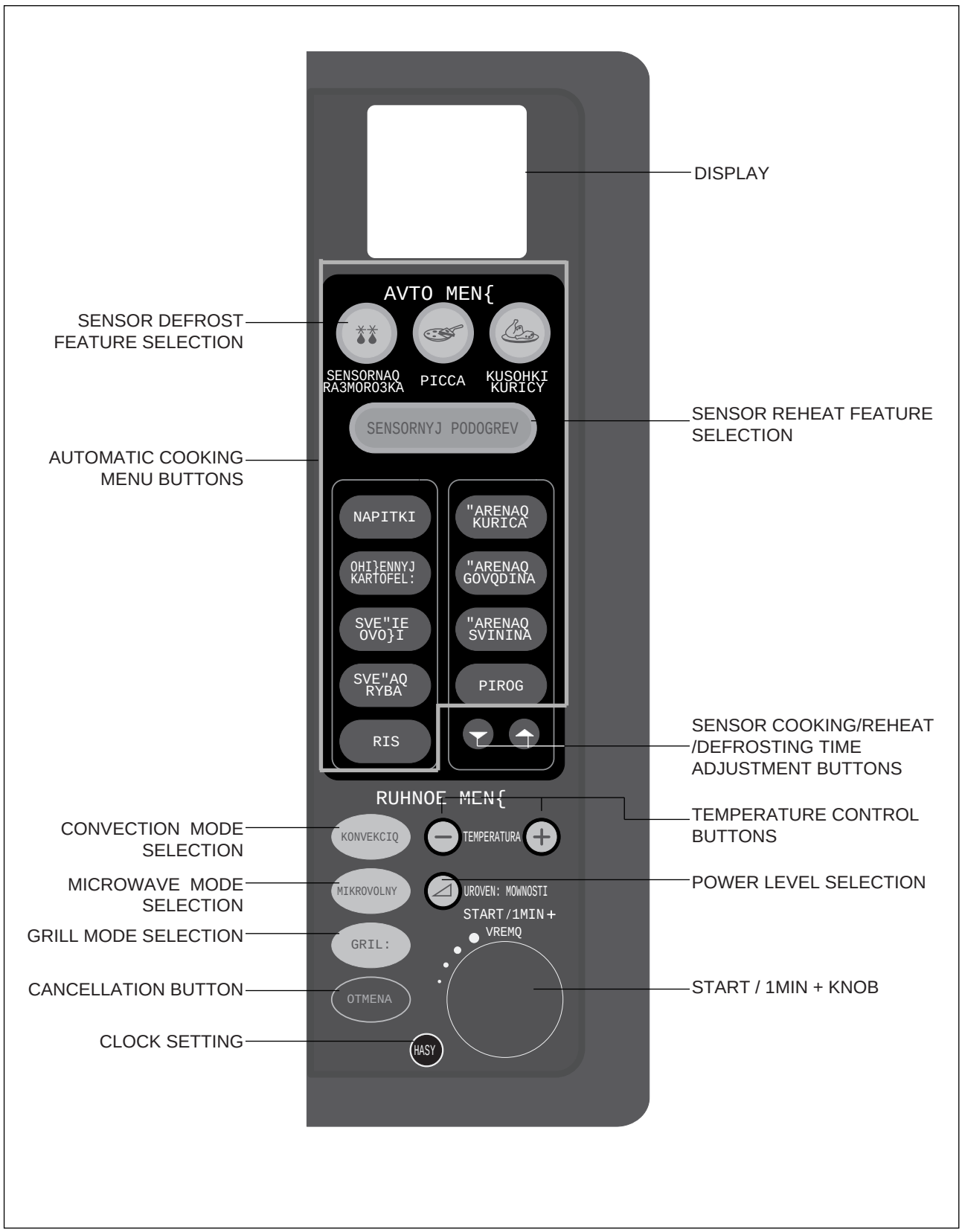
2-1 Table of Specifications

TIMER	MWO : 60 MINUTES GRILL : 60 MINUTES CONVECTION : 90 MINUTES
POWER SOURCE	230V 50Hz, AC
POWER CONSUMPTION	MICROWAVE : 1,200W GRILL (Upper Heating Element): 1,300W CONVECTION : (Upper Heating Element): 1,300W (Lower Heating Element): 1,500W
OUTPUT POWER	FROM 70W TO 700W (10 LEVEL POWER) (IEC-705 TEST PROCEDURE)
OPERATING FREQUENCY	2,450MHz
MAGNETRON	OM75PH(21)ESS
COOLING METHOD	COOLING FAN MOTOR
OUTSIDE DIMENSIONS	498(W) x 330(H) x 461(D)

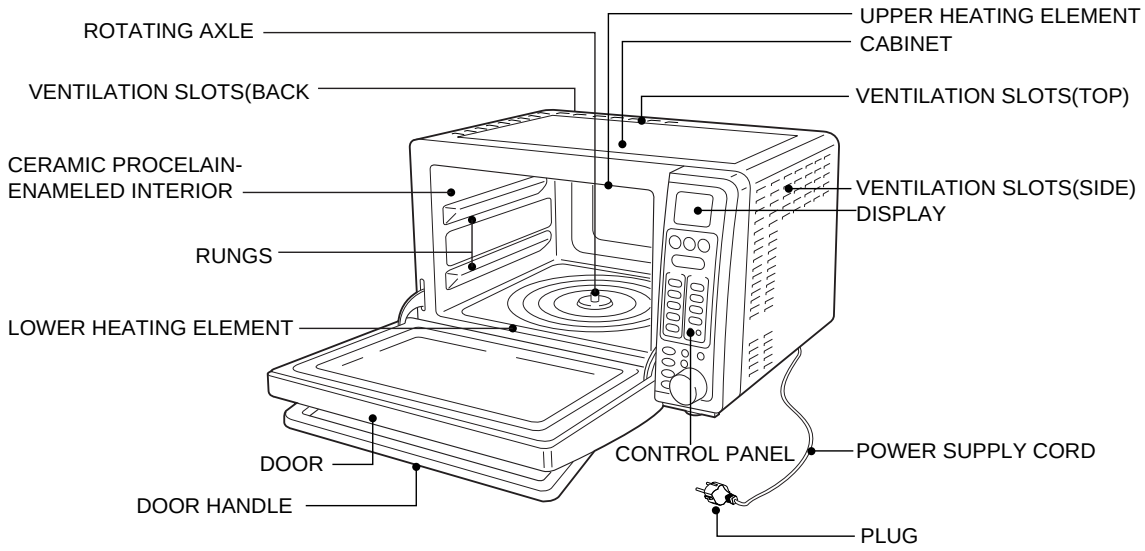
POWER LEVEL		ON TIME	OFF TIME
%	Output		
10%	70W	4 sec	26 sec
20%	140W	7 sec	23 sec
30%	210W	10 sec	20 sec
40%	280W	13 sec	17 sec
50%	3505W	16 sec	14 sec
60%	420W	19 sec	11 sec
70%	490W	22 sec	8 sec
80%	560W	25 sec	5 sec
90%	630W	28 sec	2 sec
100%	700W	30 sec	0 sec

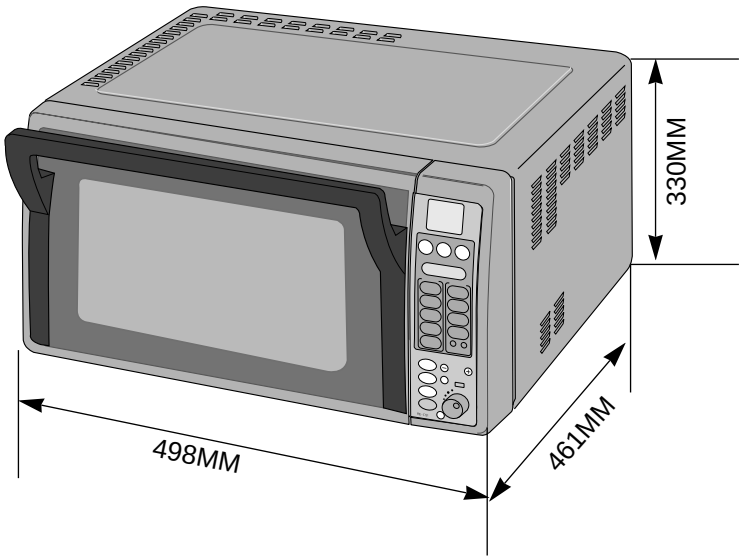
3. Operating Instructions

3-1 Control Panel



3-2 Features & External Views

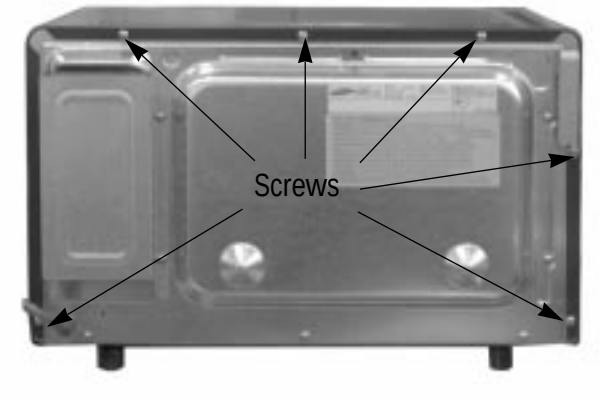




4. Disassembly and Reassembly

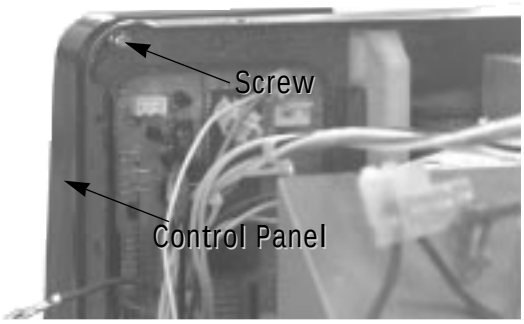
4-1 Removal of Outer Panel

1. Pull off the plug.
2. Unfasten outer panel bracket- chimney and setting screws (six pieces).
3. Draw the outer panel backward just as making widening both sides of lower part on the back of outer panel.



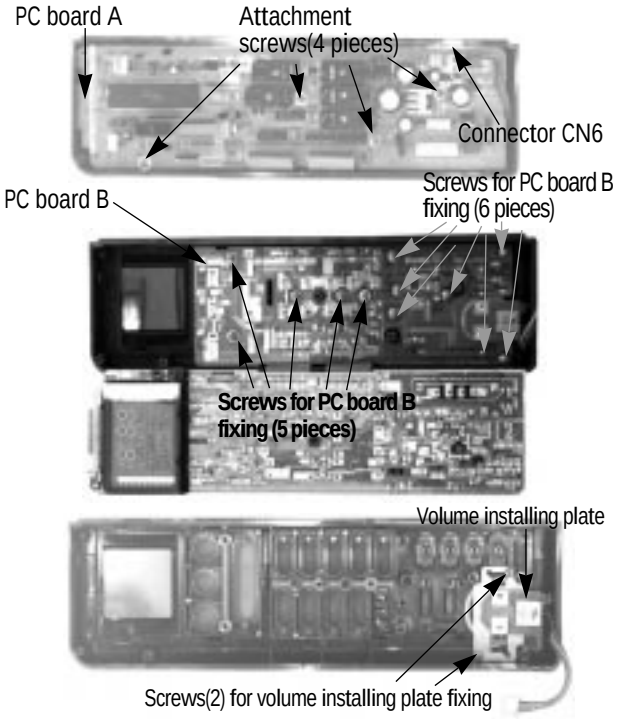
4-2 Removal of Control Panel

1. Remove the wiring. (Don't assert force on the lead of the terminal for relay but hold the positive cable to remove it.)
2. Unscrew and remove the panel setting screws(1 piece)
3. When lifting the control panel, the parts like toenail(four locations) will fall down.
4. Draw them as they are to remove them.



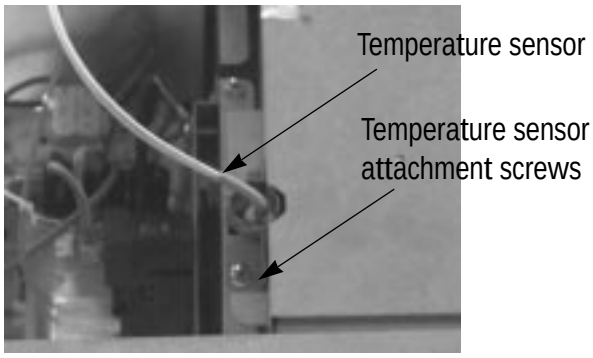
4-3 Replacement of PC board A,B and Volume installation plate

1. Remove the operating panel as under (4-2).
2. Remove the connector CN6 above the PC board.
3. Remove four screws for PC board fixing.
4. Remove parts like toenail on the operating panel and then the PC board A.
5. Remove eleven screws for PC board fixing.
6. Remove the PC board B from the operating panel.
7. Remove two screws for volume installing plate attachment.


PC board A
Attachment screws(4 pieces)
Connector CN6
PC board B
Screws for PC board B fixing (6 pieces)
Screws for PC board B fixing (5 pieces)
Volume installing plate
Screws(2) for volume installing plate fixing

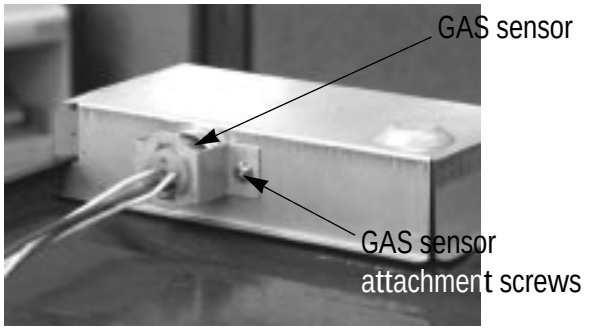
4-4 Replacement of Temperature Seneor

1. Remove the wiring(CN3).
2. Remove the screw(1 piece) for temperature sensor attachment.
3. Remove the temperature sensor.



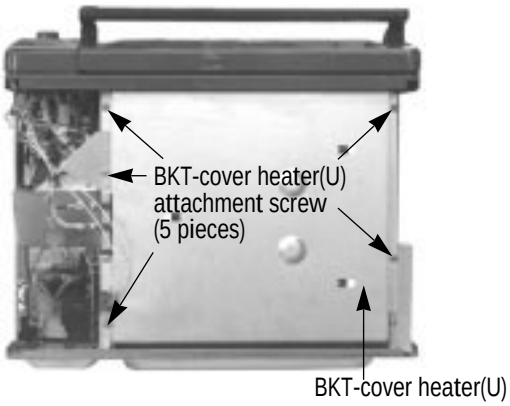
4-5 Replacement of Gas Sensor

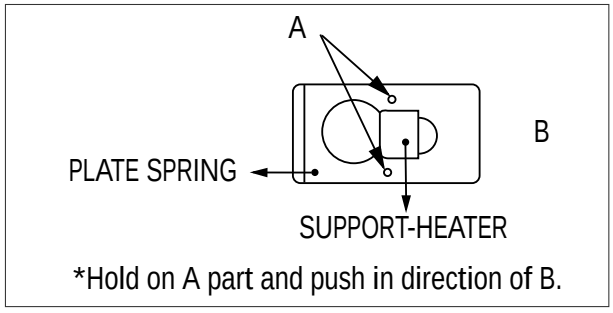
1. Remove the screw for the sensor attachment on the back of exhaust duct.
2. Remove the gas sensor from the housing.

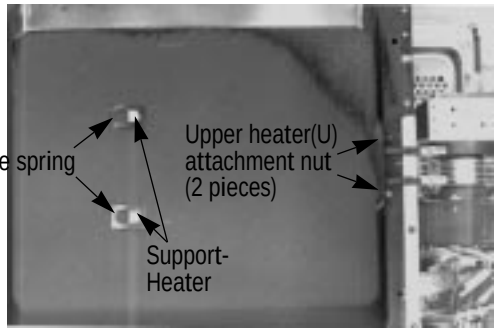


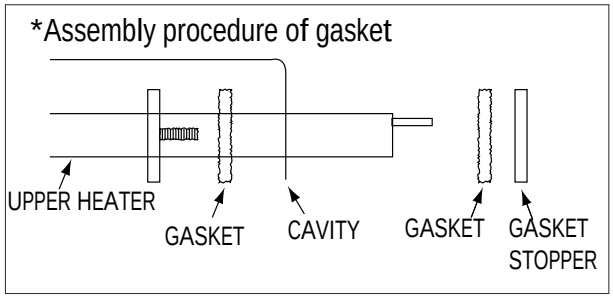
4-6 Replacement of Upper Heater(Bkt-cover heater(U), Gasket stopper,Gasket, Plate spring, Support heater)

1. Remove the wiring.
2. Remove the screws(five pieces) for Bkt-cover heater(u) setting.
3. Remove the heater attachment nut(2) with 7mm driver. (Then the gasket stopper and gasket get apart)
4. Press the plate to remove the support-heater(two pieces).
5. Remove the upper heater.



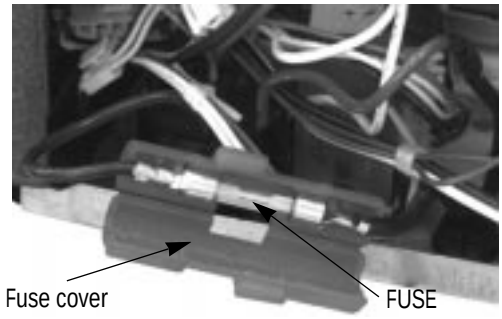






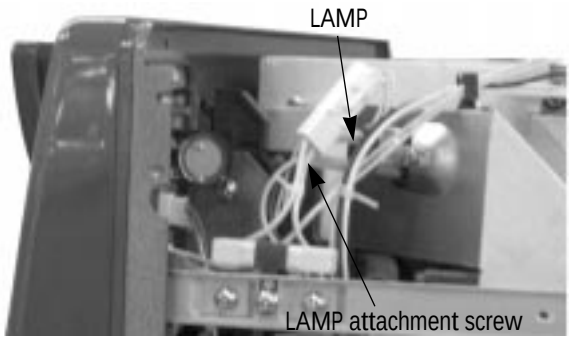
4-7 Replacement of Fuse

1. Plug off the power cord.
2. Remove fuse cover and the fuse.
   After replacement of fuse the fuse cover must be reset.



4-8 Replacement of Lamp

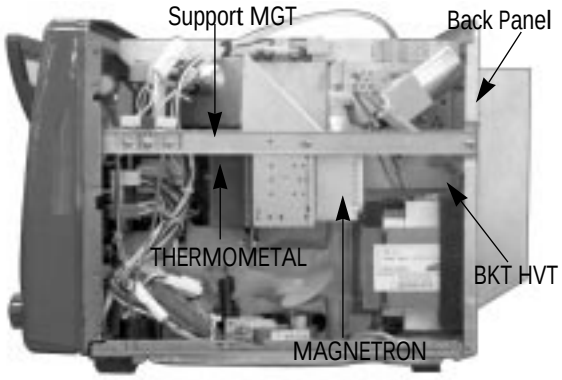
1. Remove the wiring.
2. Remove the lamp attachment screw(1 piece) and the lamp.

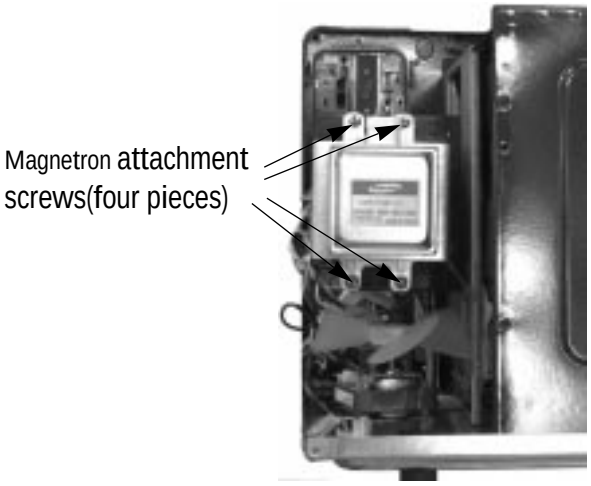


4-9 Replacement of Magnetron, Thermometal switch

1. Remove the wiring
2. Remove the support-MGT.(Screw 1 piece).
3. Remove the back-panel. (Screw seven piece)
4. Remove the BKT-HVT.(Screw: upper resp. lower each two)
5. Remove the magnetron attachment screws(four pieces) and then the magnetron.
6. Thermo switch is removed together with.

   Care the high tension voltage when removing wiring.

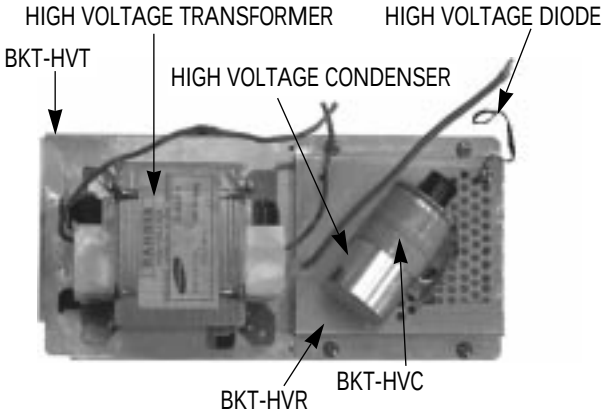




4-10 Replacement of High Voltage Trans, Condenser and Diode

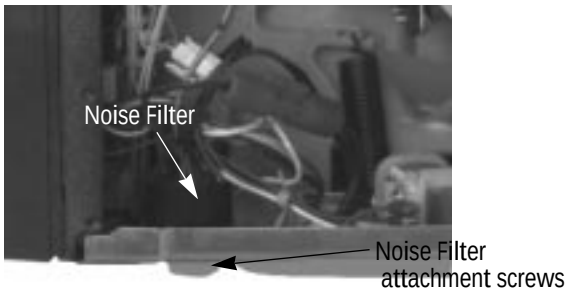
1. Remove the magnetron from the BKT-HVT removed as under (4-9).
2. Remove wiring.
3. Remove BKT-HVR.(Four screws)
4. Remove BKT-HVC.(one screw)
5. Remove high voltage condenser.
6. Remove high voltage transformer.

In case that condenser is charged with electricity make short-circuit between chassis and the high tension circuit.



4-11 Replacement of Noise Filter

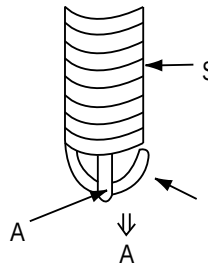
1. Remove wiring.
2. Remove the noise filter attachment screws with 13mm wrench.
3. Remove the noise filter.



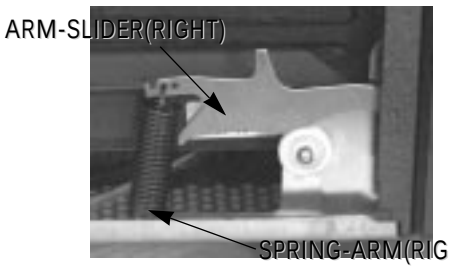
4-12 Replacement of Door assembly

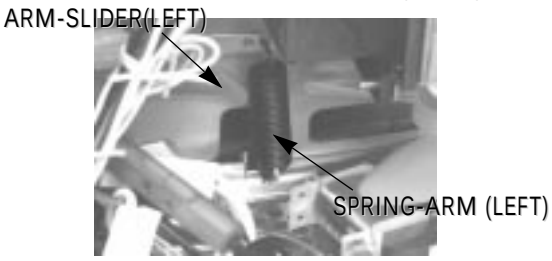
1. Remove spring arm with radio pincers. (left and right each one)
2. Remove arm slider. (left and right each one)
3. Remove the spring-stopper.(one at the lower left).
4. Open the door to remove it pressing lefthand.

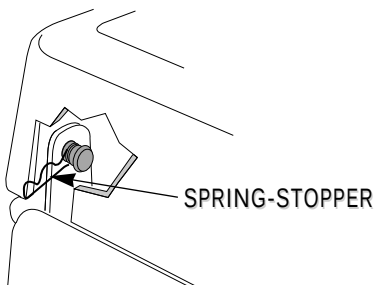
Method to detach the spring-arm



This part is despatched by turning the radio pincers in the direction of A.

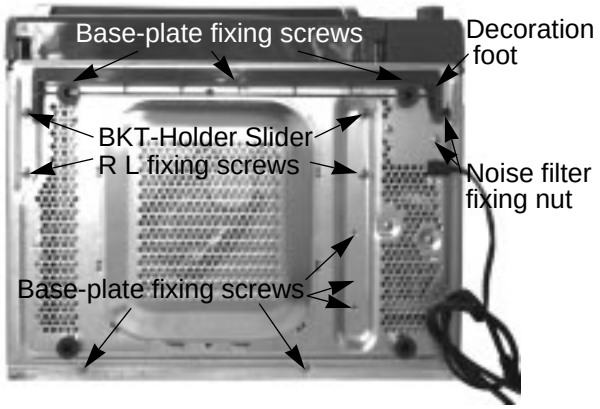


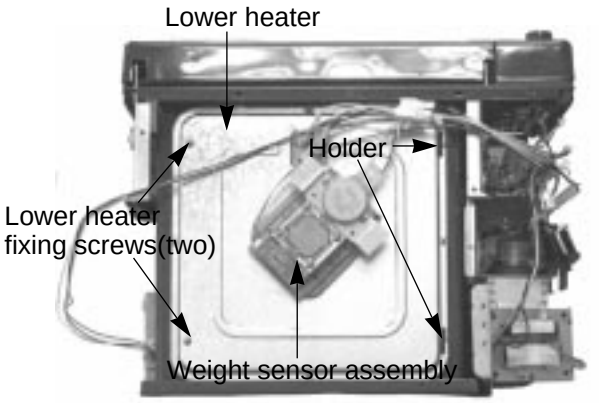




4-13 Replacement of Lower Heater and Weight Sensor assembly

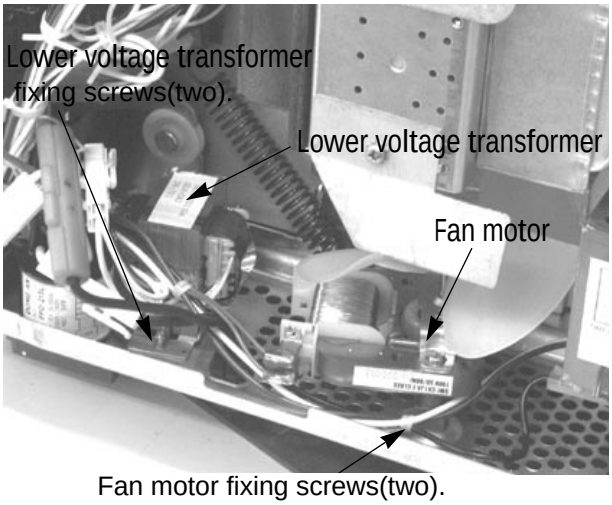
1. Remove the wiring(High voltage transformer primary, fan motor, low voltage transformer, Power cord input).
2. Remove the back-panel.(seven screws)
3. Remove the decoration-foot. (two screws)
4. Remove four BKT-holder slider(R,L) attachment screws and eight base-plate attachment screws.
5. Remove the nuts of noise filter.
6. Remove the base-plate.
7. Remove the wiring.
8. Remove the weight sensor assembly.
9. Remover the BKT-weight-sensor B.
10. Remove the lower heater attachment screws.
11. Remove the lower heater.





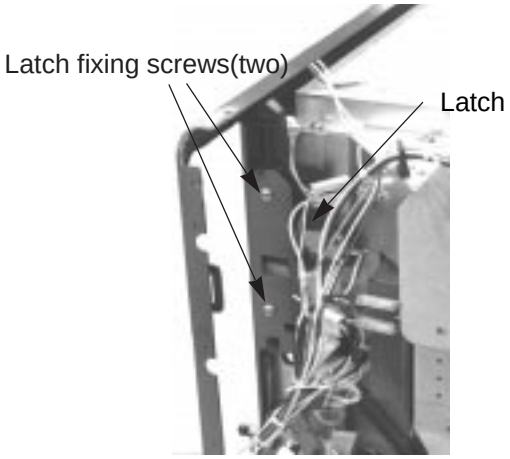
4-14 Replacement of Fan Motor and Lower Voltage Transformer

1. Remove the wiring(fan motor, low tension transformer primary and secondary).
2. Remove the screws(two for fan motor and two for low voltage transformer).
3. Remove the fan heater.
4. Remove the low voltage transformer.



4-15 Replacement of Body Latch

1. Remove the wiring.
2. Remove the operating panel as under (2).
3. Remove the latch fixing screws(two).
4. Remove the latch.

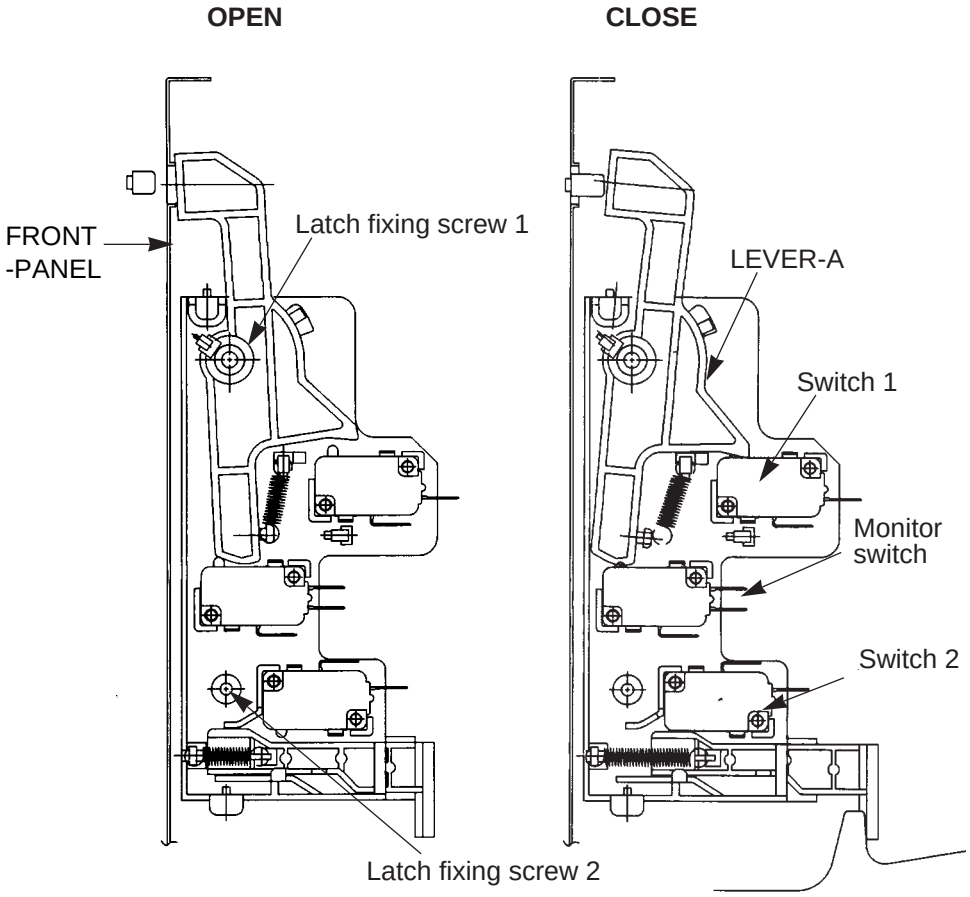


Latch adjustment method

1) Pressing the latch fixing screw 1 towards the front panel, make the A surface of lever fully press the button of switch 1 and then fasten up the latch fixing screws.

Note) A gap between the door and front panel may be formed if the pressing is too hard.

2) Fasten the latch fixing screws in this state.



5. Alignment and Adjustments

PRECAUTION

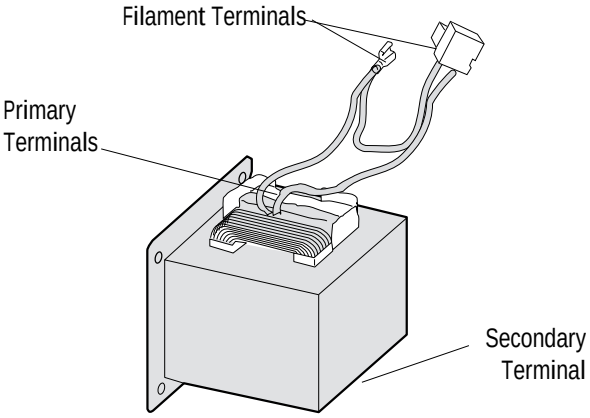
1. High voltage is present at the high voltage terminals during any cook cycle.
2. Do not attempt to measurement the high voltage.
3. Before touching any oven components or wiring, always unplug the oven and discharge the high voltage capacitor.

5-1 High Voltage Transformer

1. Remove connectors from the transformer terminals and check continuity.
2. Normal resistance readings are as follows:

MODEL	SHV-CH1EG1
Secondary	95.7Ω ± 10%
Filament	Shows Continuity
Primary	1.31Ω ± 10%

(Room temperature = 20˚C)



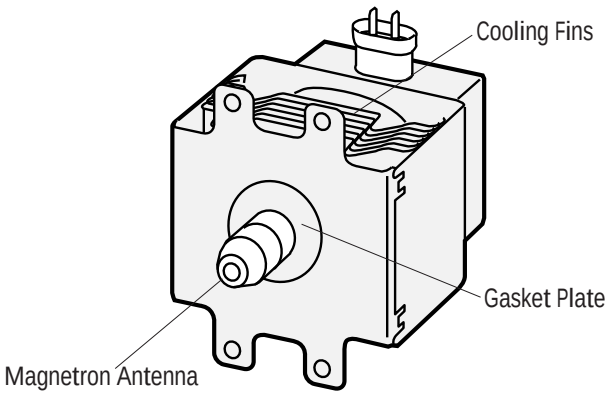
5-2 Low Voltage Transformer

1. The low voltage transformer is located on the base plate.
2. Remove the low voltage transformer from the base plate and check continuity.
3. Normal resistor readings a shown in the table.

Terminals	Resistance
1~2(Input)	228.9Ω
3~4(Output 22.8V)	3.15Ω
5~6(Output 8.4V)	0.95Ω
7~8(Output 3.0V)	1.03Ω

5-3 Magnetron

1. Continuity checks indicate only an open filament or a shorted magnetron. To diagnose an open filament or shorted magnetron, do the following:
2. Isolate the magnetron from the circuit by disconnecting its leads.
3. A continuity check across the magnetron filament terminals should indicate one ohm or less.
4. A continuity check between each filament terminal and the magnetron case should read open.



5-4 High Voltage Capacitor

1. Check continuity of the capacitor with the meter set at the highest resistance scale.
2. Once the capacitor is charged, a normal capacitor shows continuity for a short time, and then indicates 9MΩ.
3. Shorted capacitor indication: continuity.
4. Open capacitor noication constant 9MΩ.
5. Resistance between each terminal and chassis should read infinite.

5-5 High Voltage Diode

1. Isolate the diode from the circuit by disconnecting its leads.
2. With the ohm-meter set at the highest resistance scale, measure across the diode terminals. Reverse the meter leads and read the resistance.

   A meter with 6V, 9V or higher voltage batteries should be used to check the front-to back resistance of the diode. (Otherwise an infinite resistance may be read in both directions.) The resistance of a normal diode will be infinite in one direction and several hundred KΩ in the reverse direction.

5-6 Main Relay and Power Control Relay

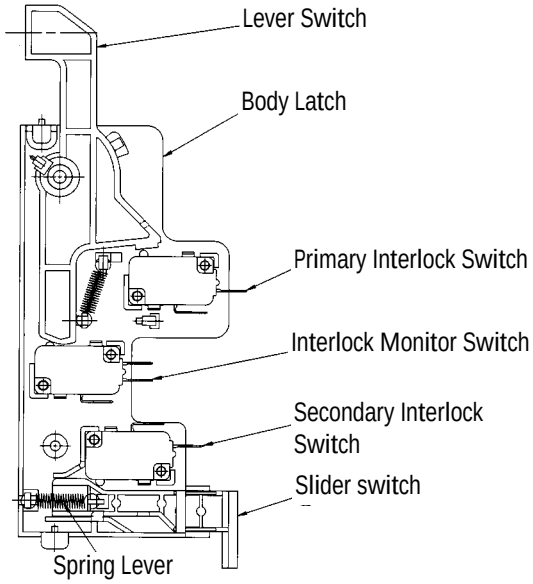
1. The relays are located on the PCB Ass'y. Isolate them from the main circuit by disconnecting the leads.
2. Operate the microwave oven with a water load. Set the power level to "high"
3. Check continuity between terminals of the relays after the start pad is pressed.

5-7 Adjustment of Primary Switch, Secondary Switch and Monitor Switch

Precaution

For continued protection against radiation hazard, replace parts in accordance with the wiring diagram and be sure to use the correct part number for the following switches: Primary and secondary interlock switches, and the interlock monitor switch (replace all together). Then follow the adjustment procedures below. After repair and adjustment, be sure to check the continuity of all interlock switches and the interlock monitor switch.

1. When mounting primary switch and interlock monitor switch to latch body, consult the figure.
2. No specific adjustment is necessary during installation of primary switch and monitor switch to the latch body is necessary.
3. When mounting the Latch Body to the oven assembly, adjust the Latch Body by moving it so that the oven door has vo "play". Check for play by pulling the door assembly. Make sure that the latch keys move smoothly after adjustment is completed. Completely tighten the screws holding the latch body to the oven assembly.
4. Reconnect to Monitor switch and re-check that the the monitor circuit and all latch switches are secured.(see components test procedures).
5. Confirm that the gap between the switch housing and the switch actuator is no more than 0.5mm when door is closed.



	Door Open	Door Closed
Primary switch	∞	0
Monitor switch (COM-NC)	0	∞
Monitor switch (COM-NO)	∞	0
Secondary switch	∞	0

5-8 Output Power of Magnetron

CAUTION
MICROWAVE RADIATION

DO NOT ALLOW EXPOSURE TO MICROWAVE RADIATION FROM ANY PARTS CONDUCTING MICROWAVE ENERGY.

The output power of the magnetron can be measured by performing a water temperature rise test.
Equipment needed :
* One 1-liter cylindrical borosilicate glass vessel (Outside diameter 190 mm)
* One glass thermometer with mercury column
NOTE: Check line voltage under load. Low voltage will lower the magnetron output. Brenk the line here make all temperature and time tests with accurate equipment.

1. Fill the one liter glass vessel with water.
2. Stir water in glass vessel with thermometer, and record glass vessel's temperature ("T1", 10±1˚C).
3. After moving the water into another glass vessel, place it in the center of the cooking tray. Set the oven to high power and operate for 61 seconds exactly. (2 seconds included as a holding time of magnetron oscillation.)
4. When heating is finished, stir the water again with the thermometer and measure the temperature ("T2").
5. Subtract T1 from T2. This will give you the water temperature rise. (ΔT)
6. The output power is obtained as follows :

$$\text{Output Power} = \frac{4.187 \times 1000 \times \Delta T + 0.88 \times Mc \times (T_2 - T_0)}{59}$$

59 : Heating Time (sec)
4.187 : Coefficient for Water
1000 : Water (cc)
ΔT : Temperature Rise (T_2-T_1)
Mc : Cylindrical borosilicate glass weight
To :Room temperature

* Output (W) = 85.5x ΔT

7. Normal temperature rise for this model is 9˚C to 11˚C at 'HIGH'.
   NOTE 1: Variations or errors in the test procedure will cause a variance in the temperature rise. Additional power test should be done if temperature rise is marginal.
   NOTE 2: Output power in watts is computed by multiplying the temperature rise (step E) by a factor of 71 times the centigrade temperature.

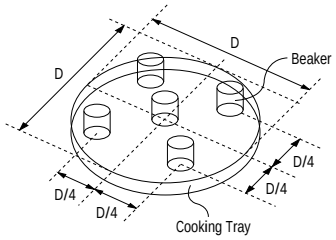
5-9 Uniformity of Microwave Heat Distribution

The microwave heat distribution can be checked indirectly by measuring the water temperature rise at certain positions in the oven:

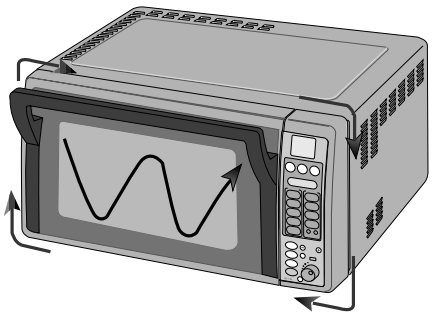
1. Prepare five beakers made of 'Pyrex', each having 100 milliliters capacity.
2. Measure exactly 100milliliters off water load with a measuring cylinder, and pour into each beaker.
3. Measure the temperature of each water load. (Readings shall be taken to the first decimal.)
4. Put each beaker in place on the cooking tray as illustrated in the figure. Start heating.
5. After heating for 2 minutes, measure the water temperature in each beaker.
6. Microwave heat distribution rate can be calculated as follows:

$$\text{Heat Distribution} = \frac{\text{Minimum Temperature Rise}}{\text{Maximum Temperature Rise}} \times 100(\%)$$

The result should exceed 65%.



5-10 Procedure for Measurement of Microwave Energy Leakage

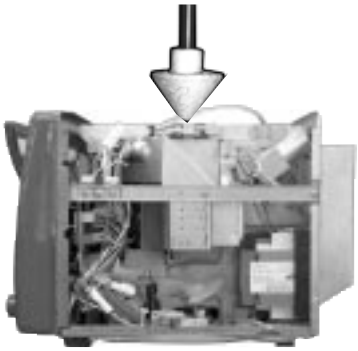


1) Pour 275¡ 15cc of 20¡ 5¡ (68¡ 9¢) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.
2) Start to operate the oven and measure the leakage by using a microwave energy survey meter.
3) Set survey meter with dual ranges to 2,450MHz.
4) When measuring the leakage, always use the 2 inch spacer cone with the probe. Hold the probe perpendicular to the cabinet door. Place the spacer cone of the probe on the door and/or cabinet door seam and move along the seam, the door viewing window and the exhaust openings moving the probe in a clockwise direction at a rate of 1 inch/sec. If the leakage testing of the cabinet door seam is taken near a corner of the door, keep the probe perpendicular to the areas making sure that the probe end at the base of the cone does not get closer than 2 inches to any metal. If it gets closer than 2 inches, erroneous readings may result.
5) Measured leakage must be less than 4mW/cm^2, after repair or adjustment.

> Maximum allowable leakage is 5mW/cm^2.
> 4mW/cm^2 is used to allow for measurement and meter accuracy

5-11 Check for Microwave Leakage

1. Remove the outer panel.
2. Pour 275±15cc of 20±5°C(68±9°F) water in a beaker which is graduated to 600cc, and place the beaker in the center of the oven.
3. Start the oven at the highest power level.
4. Set survey meter dual ranges to 2,450MHz.
5. Using the survey meter and spacer cone as described above, measure arnear the opening of magnetron, the surface of the air guide and the surface of the wave guide as shown in the following photo.(but avoid the high voltage components.) The neading should be less than 4mW/cm^2.



5-12 Note on Measurement

1) Do not exceed the limited scale.
2) The test probe must be held on the grip of the handle, otherwise a false reading may result when the operator's hand is between the handle and the probe.
3) When high leakage is suspected, do not move the probe horizontally along the oven surface; this may cause damage to the probe.
4) Follow the recommendation of the manufacturer of the microwave energy survey meter.

5-13 Leakage Measuring Procedure

5-13-1 Record keeping and notification after measurement

1) After adjustment and repair of a radiarion preventing device, make a repair record for the measured values, and keep the data.
2) If the radiation leakage is more than 5 mW/§† after determining that all parts are in good condition, functioning properly and the identical parts are replaced as listed in this manual notift that fact to ;

SMSC	SESPO	SUSC	SALSC
"JV SAMSUNG SERVICE" LTD RUSSIA, 123308 MOSCOW,MARSHALA ZHUKOVAPR,1,OFFICE 201	SAMSUNG ELECTRONICS CO.,LTD ST.PETERSBERG OFFICE 5,1TALIANSKAYASTR. ST.PETERSBERG,191011,RUSSIA	SAMSUNG UKRAINE SERVICE CO.LTD 7 ZHILIYANSKAYA STREET. KIEV 252033. UKRAINE	SAMSUNG ALMATY SVC CO. 52A MICROREGION ORIBITA-3 ALMATY.480043 REPUBLIC OF **KAZAHSTAN**

5-13-2 At least once a year have the microwave energy survey meter checked for accuracy by its manufacturer.

6. Circuit Description

6-1 When food is placed inside oven and door is closed

1. Low voltage transformer supplies the necessary voltage to the touch control circuit when power cord is plugged in.
2. The primary interlock switch is closed, this door sensing switch sends the door-close signal tothe touch control circuit.
3. The interlock monitor switch is opened. This interlock monitor switch blows the 10A fuse and stops magnetron oscillation when the door is opened (abnormal condition).
4. The secondary interlock switch is closed.

6-2 When cooking, power and time are set by touching the function pads

1. The time appears in the display window.
2. The touch control circuit stores the cooking data at.

6-3 When the START pad is touched

1. The main relay and the power control relay are controlled by the touch control circuit.
2. An oven lamp lights the inside of the oven by the main relay in the touch control circuit.
3. The fan motor rotates and cools the magnetron by blowing the air from the intake (on the base plate) over the magnetron fins. After cooling the fins, this air is directed into the oven to blow out the vapor.

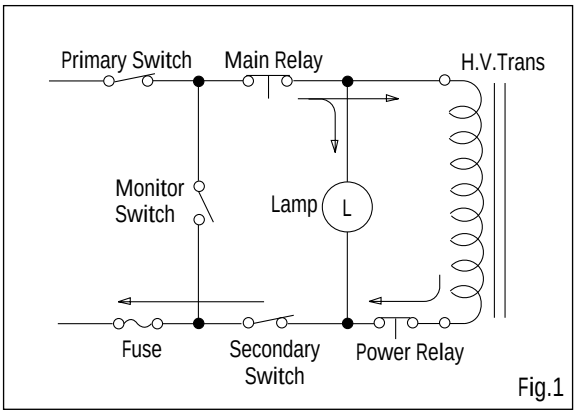


Fig.1

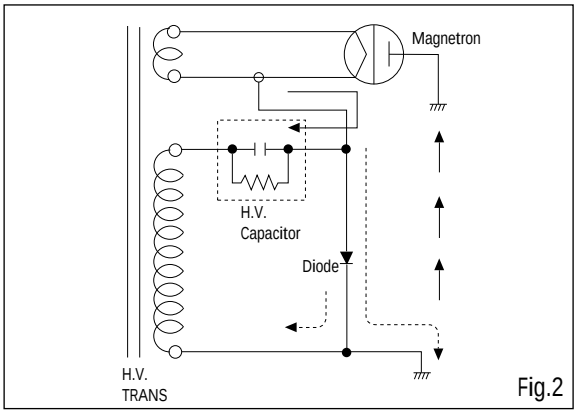
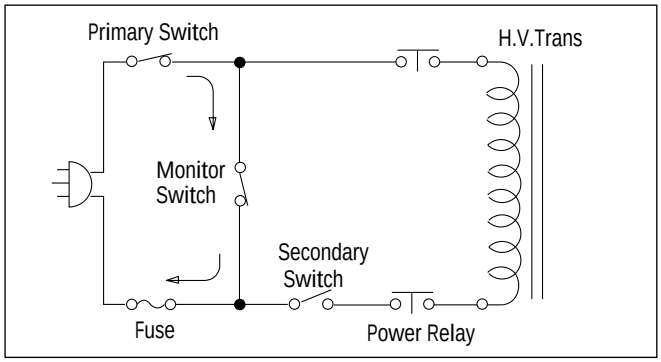


Fig.2

4. 230V~50Hz AC is applied to the high voltage transformer through the contacts of primary windings (shown by the solid line) just after the power control relay turns ON. (Fig. 1)
5. 3.4V AC is generated from the filament winding of the high voltage transformer. This 3.4V is applied to the magnetron to heat the magnetron filament through two noise preventing choke coils.
6. High voltage (2,230 volts AC) is generated by the high voltage transformer secondary. This secondary voltage is increased by the diode and high voltage capacitor. This resultant DC voltage is then applied to the anode of the magnetron. As shown in Fig. 2, the first half cycle of the high voltage produced in the secondary high voltage transformer charges the high voltage capacitor.The dotted lines indicate the current flow. During operation of the second half cycle, the voltage produced by the transformer secondary (plus the charge of the high voltage capacitor) is applied to the magnetron as shown in the solid line, which cawses the magnetron to oscillate. The electrlcal interference generated by the magnetron is prevented by the 1.6uH choke coils, 500pF filter capacitors and the magnetrons shielded case (so that TV and radio signals are immune).
7. The power control relay is turned on intermittently by the touch control circuit (when the oven is set at any power) except full power. The touch control circuit controls the ON/OFF time of the power control relay in order to vary the output power of the microwave oven from Low to "Full" power. One complete ON/OFF cycle of the power control is 30 seconds.
8. The cooking when the oven is set at any power setting is shown on the display (starts to count down.)

6-4 When the door is opened during cooking

1. The primary interlock switch is opened to cut off the primary voltage of the high voltage transformer. This stops microwave oscillation.
2. The door sensing switch(the primary switch) is opened which signals the touch control circuit. The main relay stays on, the power control relay turns off and the display stops counting down.
3. The tuen table motor is stopped and the oven lamp is furned off by operation of the primary interlock switch. The fan motor is stopped by fan motor relay on the touch control circuit.
4. Upon opening the door, the contacts of the primary and secondary interlock switch open and the contacts of interlock monitor switch close.
5. If the contacts of primary interlock switch do not function properly, the fuse blows out because of the large current surge (caused by the monitor switch activation, which stops magnetron oscillation). see Fig. 3



6-5 When the CANCEL pad is touched during cooking

1. Touching the CANCEL pad cancels all programs stored in the touch control circuit. The time of day reappears on the display window.
2. The oven lamp and cooking indicators turn off.
3. The fan motor stops.
4. The power control relay turns off to cutting the primary voltage to the high voltage transformer (This stops magnetron oscillation).

7. Troubleshooting

PRECAUTION

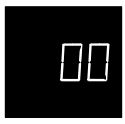
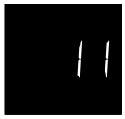
1. CHECK GROUNDING BEFORE CHECKING FOR TROUBLE.
2. BE CAREFUL OF THE HIGH VOLTAGE CIRCUIT.
3. DISCHARGE THE HIGH VOLTAGE CAPACITOR.
4. WHEN CHECKING THE CONTINUITY OF THE SWITCHES OR TRANSFORMER, DISCONNECT ONE LEAD WIRE FROM THESE PARTS AND THEN CHECK CONTINUITY WITHOUT THE POWER SOURCE ON. TO DO OTHERWISE MAY RESULT IN A FALSE READING OR DAMAGE TO YOUR METER.
5. DO NOT TOUCH ANY PART OF THE CIRCUIT OR THE CONTROL CIRCUIT BOARD, SINCE STATIC DISCHARGE MAY DAMAGE IT. ALWAYS TOUCH GROUND WHILE WORKING ON IT TO DISCHARGE ANY STATIC CHARGE BUILT UP.

7-1 Weight sensor

7-1-1 Specification of weight sensor

-Range of weight measurement.....in cooking: 0 - apprx. 2000g(Weight of over round dish)
(Specification of weight sensor: 0-apprx. 4000g)

7-1-2 Method of adjusting 0 point.

Operation	Display in operation
1. Plug in the cord.	1. All the displays of display unit get on.
2. Open the door to put rotating plate and round dish into range.	1. As above.
3. Close the door and press the "P/L (⊿)" key and "(⊕)" key simultaneously.	1. "00" display lights up. (Lamp in range turns on and round dish rotates). 2. "285-335" light up after about 12 second. 
4. Open the door to put a weight of balance of 1kg(or two of 500g) on the center of round dish(Note 1).	1. Same as 3-2.
5. Close the door and press simultaneously the "P/L (⊿)" and "(⊖) keys.	1. "11" display lights up. "11" gets out after about 12 seconds. 2. After about 3 seconds after "11" is out, "35-65" light up. 
6. Press the "Cancel" key.	1. "0" display lights up. (The inside lamp turns off and rotation of the round dish stops).

(Note1) Substitute the weight of balance with a beaker of 1kg total weight filled with tap water).

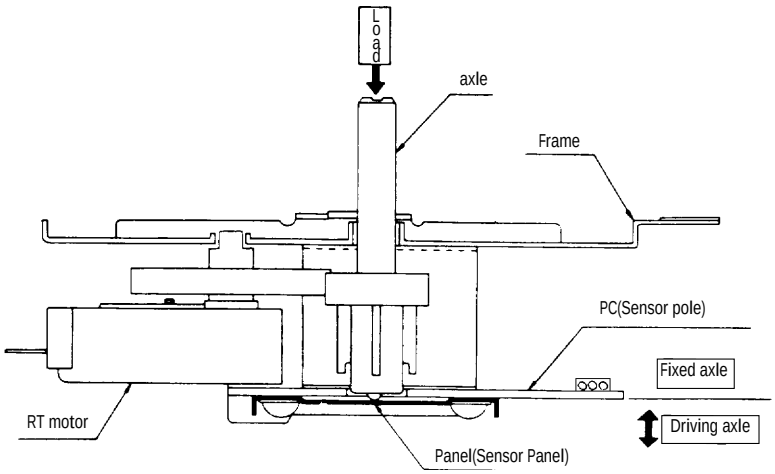
7-1-3 Method for checking 0 point

Items to check:	Confirmation key	Confirmation
Value at 0 point	Regulation for CANCEL + MORE (▲) key, simultaneously pressed.	Display of previous regulated value at 0 point, for example: 315
Value of inclination	Regulation for CANCEL + LESS (▼) key, simultaneously pressed.	Display of previous regulated value of declination, for example: 49

7-1-4 Details of functions of Weight Sensor

7-1-4-1. What is the weight sensor

1. The weight sensor detects weights of objects such as assembly to set automatically optimum heating time according to the weight determined, contributing to improvement of operation.



7-1-4-2. Features

a. Configuration of plate-spring :
Onto the structure comprising electric pole on PC board and plate spring(sensor plate),assembly the driving axle, and let the axle to move, with the action of spring, to move the spring to measure weight.

b. Condenser measuring type :
This is a method to measure weight asthat, when a load is exerted on axle the plate spring(sensor plate) on driving axle will come down to enlarge the gap away from the sensor electric pole on the fixed PC board and thus the electrostatic capacity will be changed, by which the oscillation of weight sensor PC board changed, and it allows to measure the weight by.

7-1-4-3. Description of functions performance

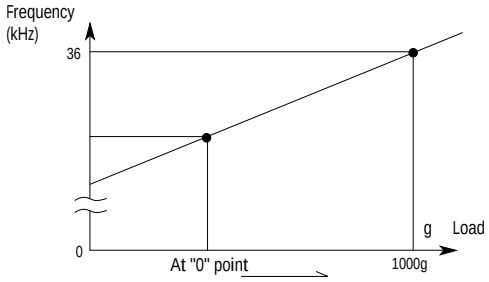
a. Functions of weight sensor PC plate(oscillator)

a-1. Frequency of oscillation

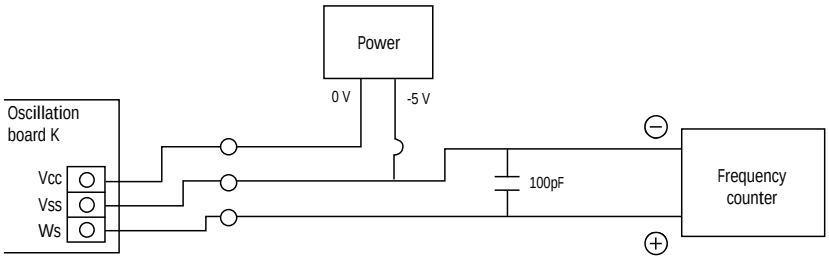
-. Adjusting "0" point ----- appr.31 kHz

-. Loading 1000g on round plate ----- appr. 5kHz(indicating increment of 5kHZ from adjusting 0.)

a-2. Load exerted on axle and oscillating frequency(kHz)



7-1-4-4. Wiring diagram for measuring frequency



7-1-5 Precautions

1. Do not apply heavy load or pressure on the rotating dish
   (The weight sensor directly contact the rotating dish).
   Putting food that exceeds 4kg(Total) can damage the weight sensor.
2. Use only genuine replacements that fit the model(C.E., rotating dish and supporter).

7-2 Simple Troubleshooting Chart

7-2-1. Simple troubleshooting

Item	Checking Procedure
Inspection of microwave oven cooking	a. Put about 200cc of tap water (water temperature 10-18°) on the rotating dish. b. Do the following :. Microwave oven high ¡ time setting 5 minute ¡ start cooking c. The water temperature should be about 80°
Inspection of grill cooking	a. Put the applicable " cooker" for grill cooking inside b. Do the following grill ¡ time setting 5 minutes ¡ start cooking. c. Normal : The seatheheater is red.
Inspection of convection cooking	a. Put the applicable "cooker" for convection cooking inside. b. Do the fellowing Convection ¡ temp. setting 250°C ¡ time setting 5 minute. c. Normal : The upper-heater and lower cavity emit heat.
Do not directly touch the Upper-Heater, Lower-Heater and plate, that become hot during or remain hot after heating.	

7-2-2. Error codes

Error indication	Cause of occurrence	Management method	Remarks
E0	Gas sensor open/short (sensor value between 6 and 211)	Check the connection and cooking reheating Put the power switch again and and use it after 10 minutes.	Automatic reheating
E1	Exceeds of T1 time limit (gas sensor)	First press the cancel key and check if the food is positiotes	Automatic reheating
E3	Thermister open/short.	Check the wire connection.	
E4	Problem with the weight sensor (Output frequency=0Hz)	Exchange the weight sensor Check the wire connection	
E10	Problen with the EEPROM	Replace the PCB assy	
C1	No tray (Occurs if oven is operated without the rotating dish.)	Install the rotating dish	

7-2-3. Hidden key

1. Check the gas sensor : Press the P/L(⊿) and MORE(▲) keys simultaneosly.
   (Display : Between 6 and 211).
2. Child lock function : Press the CANCEL and ⊕ keys simultaneosly.(🔑)
3. Cooking completion remind function : If the food is not removed after cooking,
   the buzzer sounds every minute.
4. Sound ON/OFF function : Press the CANCEL and ⊖ keys simultaneosly.

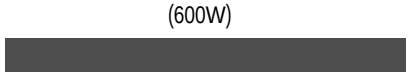
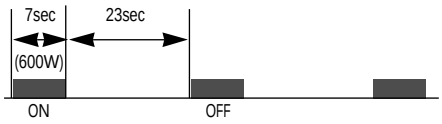
7-2-4. Reparing Parts

1. Discharge the capacitor for about 5 to 6 minutes after cutting the power, and then continue the work.
2. Do not damage the coating on the wires.
3. When removing the wire the terminal, hold the positive lock case with the finger and assemble it. Otherwise use a tool (such as long nose pliers)
4. If you remove the tie during servicing, do not damage the wire. Adjust and arrange the wire and tie(heat proof onsulated tie) after the repairs have been completed.

7-3 Explanation of the Automatic operation

7-3-1Operation in manual mode of microwave

The manual mode of MWO comprises 10 power level modes : one is that the magnetron works in full time at 600W output in manual operation which is the "range high" and another is that the magnetron repeats On-Off operation at 600W output which is the "range low" (equivalent to 200W).

Cooking:	Magnetron works	Max. time limit	Min. adjustable range
Range high (600W)		30 minutes0	0-4 minutes: 10 seconds as unit. 4-15 minutes: 30 seconds. 15-30 minutes: 1 minute as unit.
Range Low (200W)		1 hour and 30minutes	0-10 minutes: 30 seconds as unit. 10-40 minutes: 1 minute as unit. 40-90 minutes: 5 minute as unit.

7-3-2 Operation in automatic operation of the microwave

The magnetron is controlled by a micro computer program based on the data gained by the weight sensor which detects the weight of foods, gas sensor which detects gas emitted from the foods.

7-3-2-1 Oscillation of gas sensor in cooking: [Sensor reheat] [Peeled potatoes] [Fresh vegetables] [Fresh fish] [Rice]
- -. Magnetron is controlled corresponding to amount of steam emitted from foods.
- -. Remained cooking time is displayed on the panel during cooking operation.
- -. Make well the cooking by adjusting the "Regulation for completion" more and less keys(buttons).

7-3-2-2 Oscillation of weight sensor in cooking: [Sensor defrost].
- -. Magnetron is controlled according to the weight after deducting that of container.
- -. After weight is checked, remained cooking time is displayed on the panel.
- -. Make well the cooking by adjusting the "Regulation for completion" high and low keys(buttons).

7-3-3 Operation of automatic cooking by heating with heater

The heater is controlled by micro computer program according to the data from a temperature sensor(thermostat) measuring the temperature in oven and a weight sensor which measures weight of food.

7-3-3-1 Operation of temperature sensor(thermostat) for cooking: [Pizza] [Cake].
- -. Make a cooking at an optimum temperature which is controlled by thermostat according to variety of foods as well as in optimum cooking time.
- -. Cooking state can be regulated with the "Regulation for completion" more and less keys.
- -. When this process begins, the remained time is displayed on panel.

7-3-4 Operation of automatic cooking by heating mutually between heater and microwave

Magnetron and heater are controlled by a micro computer arogram which operates based on the data of temperature sensor in oven(thermostat).

7-3-4-1 Operation of temperature sensor(thermostat) for cooking : [Chicken pieces] [Roast chicten] [Roast beet] [Roast pork]
- -. Make a cooking at an optimum temperature which is controlled by thermostat according to variety of foods as well as in optimum cooking time.
- -. Cooking state can be regulated with the "Regulation for completion" high and low keys.
- -. When this process begins, the remained time is displayed on panel.

7-3-5 The function of preventing from forgetting to take foods out

For prevention of forgetting to take food out, buzzer sounds "Pee" every one time in interval of 1 minute for total ten minutes after completion of cooking.

- -. Buzzer sounding will stop when pressing cancel key.

7-4 Electrical Malfunction

SYMPTOM	CAUSE	CORRECTIONS
Oven is dead. Fuse is OK. No display and no operation at all.	1. Open or loose lead wire harness 2. Open thermal cutout (Magnetron) 3. Open low voltage transformer 4. Defective Ass'y PCB	Check fan motor when thermal cutout is defective. Check Ass'y PCB when LVT is defective.
No display and no operation at all. Fuse is blown.	1. Shorted lead wire harness 2. Defective primary latch switch (NOTE 1) 3. Defective monitor switch (NOTE1) 4. Shorted HVCapacitor 5. Shorted HVTransformer (NOTE2)	Check adjustment of primary, interlock monitor, secondary switch.
	NOTE 1: All of these switches must be replaced at the same time. (refer to adjustment instructions) Check continuity of power relay contacts and if it has continuity, replace power relay also. NOTE 2: When HVTransformer is replaced, check diode and magnetron also.	
Oven does not accept key input (Program)	1. Key input is not in-Sequence 2. Open or loose connection of sub-PCB to main PCB. 3. Squeeted buttons 4. Defective Ass'y PCB	Refer to operation procedure. Replace PCB main.
Timer starts countdown but no microwave oscillation. (No heat while oven lamp and fan motor turn on.)	1. Off-alignment of latch switches 2. Open or loose connection of high voltage circuit especially magnetron filament circuit NOTE: Large contact resistance will bring lower magnetron filament voltage and cause magnetron to lower output and/or intermittent oscillation. 3. Defective high voltage components H.V.Transformer H.V.Capacitor H.V.Diode Magnetron 4. Open or loose wiring of power relay 5. Defective primary latch switch 6. Defective power relay or Ass'y PCB	Adjust door and latch switches. Check high voltage component according to component test procedure and replace if it is defective. Replace PCB main.

7-4 Electrical Malfunction(continued)

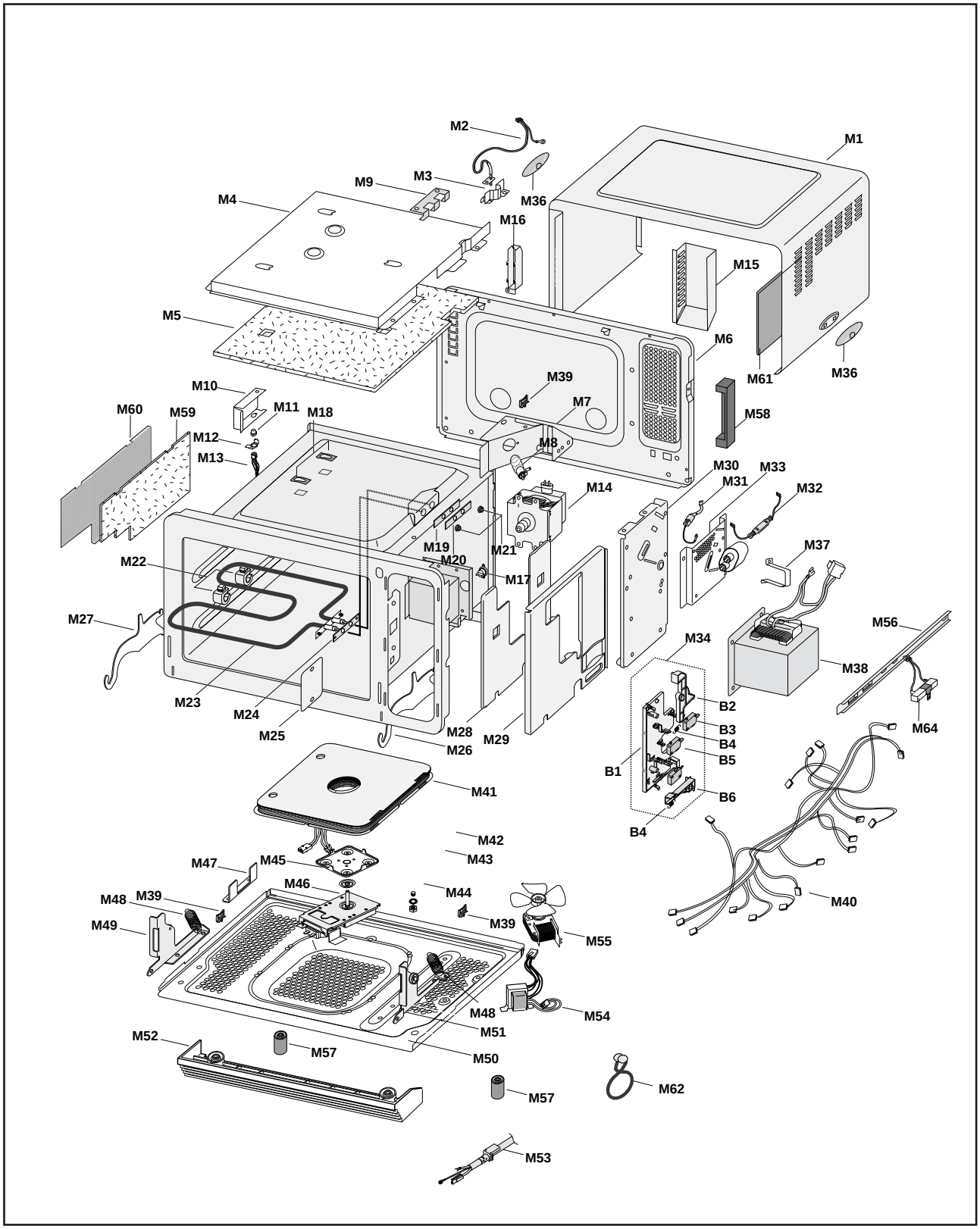
SYMPTOM	CAUSE	CORRECTIONS
Oven can program but timer does not start.	1. Open or loose wiring of primary interlock switch 2. Off-alignment of primary interlock 3. Defective primary interlock S/W	Adjust door and interlock switches.
Microwave output is low;. Oven takes longer time to cook food.	1. Decrease in power source voltage. 2. Open or loose wiring of magnetron filament circuit. (Intermittent oscillation)) 3. Aging of magnetron	Consult electrician.
Oven does not operate and return to the plugged in mode.	Defective Ass'y PCB	Replace PCB main.
Loud buzzing noise can be heard.	1. Loose fan and fan motor 2. Loose screws on H.V.Transformer 3. Shorted H.V.Diode	Tighten screws of fan motor. Tighten screws of H.V.Transformer. Replace H.V.Diode.
Turntable motor does not rotate.	1. Open or loose wiring of turntable motor. 2. Defective turntable motor.	Check the wire of turntable motor. Replace turntable motor.
Fan motor does not rotate	1. Defective fan motor 2. Defective fan motor or ass'y PCB	Replace fan motor Replace PCB main
Oven stops operation during cooking	1. Open or loose wiring of primary interlock switch 2. Operation of thermal cutout(Magnetron)	Adjust door and latch switches.
Sparks	1. Metallic ware or cooking dishes touching on the oven wall. 2. Ceramic ware trimmed with gold or silver powder also causes sparks.	Inform the customer. Do not use any type of cookware with metallic trimming.
Uneven cooking	Uneven intensity of microwave due to its characteristics.	Wrap thinner parts of the food with aluminum foil. Use plastic wrap or cover with a lid. Stir once or twice while cooking foods such as soup, cocoa, or milk.
Noise from the turntable motor when it starts to operate.	Noise may result from the motor.	Replace turntable motor.
Poor defrosting	1. Open or loose wiring of weight sensor 2. Point not adjusted	Check the connections to weight sensor Readjust the "0" point

7-5 After-Repair Check List

No	Check item	Checking and judging method	Remarks
1	Insulation resistance	When measuring the insulation resistance between the power plug and the grounding wire(with the power plug disconnected from the socket and the door closed) the resistance should be greater than 1§ or above. When to check : a. When the electric field parts are exchanged b. If the MWO is used in a very humid envir qwment c. Unit is older than 5 years	DC 500V Megatester
2	Safety switch operation	Check that the safety switch is operating correctly when opening and closing the door	Primary switch Monitor switch Secondary switch
3	Applicability of parts	Check that exact replacement parts are being used	AC 230V
4	Placement of lead wire	Check for looseness, jamming or terminal insertion of the lead wire. (check that there are no shorts to ground.	
5	Connection of screw and bolt	Check the connection between he screw and bolt.	
6	Alien substance insertion check	Check for a cut line within the equipment, combustible foreign matter, or loose hardware.	
7	Power cord check	Check that there is no damage to the cord, plug, socket etc. Also check that power rating is adequate.	
8	Grounding check	Check that the main body is grounded to the PCB. Explain to the customer that he following are dancerous hazards : a. Connection to the gas pipe b. Connection to the vinyl water pipe c. Connection to the telephone line.	For the PCB ground wire and power cord ground wire, Check the continuity to ground.

8. Exploded Views and Parts List

8-1 Exploded Views



8-2 Main Parts List

Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
M 1	DE70-30114B	PANEL-OUTER	COLORSTEEL,T0.7,W497.8,L290,GR	1	●
M 2	DE32-10073A	SENSOR-THERMISTOR	PTM-K312-S11,300'C,RE-CH1	1	
M 3	DE71-60396A	COVER-SENSOR	SECC,T0.5,W34,L100,RE-CH1	1	●
M 4	DE61-50433A	BRACKET-CV/HEATER-U	ALSTAR,T0.4,W358,L310	1	●
M 5	DE62-90097A	ADIABATIC-UPPER	SUPERFINEINSULATIO,T5,W299,L32	1	●
M 6	DE71-60363B	COVER-BACK	SGCC1-Z,T0.6,W494.8,L287.5	1	●
M 7	DE61-50460A	BRACKET-AIR GUIDE-B	SECC,T0.4	1	●
M 8	4713-001066	LAMP-INCANDESCENT	230V,-,30W,ORG,-,-,25x85mm	1	
M 9	DE61-50501A	BRACKET-WAVE(H)	SECC,T0.5,61,86,RE-CH1	1	●
M 10	DE61-50439A	BRACKET-AIR GUIDE-A	SECC,T0.4,W132,L60	1	●
M 11	DE32-60013A	SENSOR-GAS	ST-MWO	1	
M 12	DE61-50301A	BRACKET-COVER	SBHG1-A,RE-707GMS	1	
M 13	DE39-40593A	WIRE HARNESS-S	100V50/60HZ,RE-CH1,GAS	1	
M 14	DE03-30065A	MAGNETRON	OM75PH(21)ESS,900W,4.3	1	⚠
M 15	DE61-50519A	BRACKET-CHIMNEY	ALCOAT,T0.8,W17.5,D86.7,RUSSIA	1	●
M 16	DE61-50522A	BRACKET-SPACE	ALSTAR,T0.8,W104,L211	1	●
M 17	DE47-20021A	THERMOSTAT	NT-101NA(150/60,V,250V/7.5A,15	1	
M 18	DE61-70060A	SPRING-PLATE	SK-5,T0.5	2	
M 19	DE63-20061A	GASKET-HEATER	BRASS,T1.0,W15,L57	1	
M 20	DE63-20062A	GASKET-STOPPER	SECC,T1.0,57X15,RE-CH1	1	
M 21	DE60-30016A	NUT-FLANGE	M4,MSWR10	2	
M 22	DE61-30184A	SUPPORTER-HEATER	ALUMINA,T25,W20,L25	2	
M 23	DE47-70075B	HEATER-GRILL	230V,1320W,7.5,7.0	1	
M 24	DE63-20061A	GASKET-HEATER	BRASS,T1.0,W15,L57	1	
M 25	DE71-60374A	COVER-MGT	MICASHEET,T0.5,W56.5,L115	1	
M 26	DE92-90475C	ASSY-ARM SLIDER	RE-CH1/CO88R,BURR_DELETE(NI-CR	1	
M 27	DE66-10063E	ARM-SLIDER	SPC1,T2.0,W65,L148,BURR_DELETE	1	●
M 28	DE62-90096A	ADIABATIC-RIGHT	SUPERFINEINSULATION,T5,W205.5	1	●
M 29	DE61-50461A	BRACKET-OVEN CAVITY	SECC,T0.6,W213,L250.9	1	●
M 30	DE61-50436A	BRACKET-HVT	SECC,T0.8,W254.5,L123	1	●
M 31	DE59-40001A	DIODE-H.V	HVR-1X-32B-12	1	
M 32	DE91-70061B	ASSY-H.V.FUSE	THV060T-0750-H,5KV0.75A,RED	1	●
M 33	DE61-50455A	BRACKET-HVR	SECC,T0.8,W123.8,L115	1	●
M 34	DE93-20095A	ASSY BODY LATCH	CO88R,RUSSIA	1	●
M 35	2501-001011	C-OIL	910pF,2100V,BK,54x35x75mm,20mm	1	
M 36	DE71-60391B	COVER-SENSOR	PC,T1.5,W13,L66,GRAY	2	●
M 37	DE61-50120A	BRACKET-HVC	SECC,T0.6,W62,L72	1	●
M 38	DE26-10130A	TRANS-H.V	SHV-CH1EG1,230V,50HZ,2200V	1	⚠
M 39	DE65-20062A	CABLE CLAMP	DAWS-1NE,NYLON66,BLK	2	
M 40	DE39-40654A	WIRE HARNESS-A	230V50HZ,CO88R,RUSSIA	1	●
M 41	DE47-70079A	HEATER-PLATED	230V,1500W,33.2	1	●
M 42	DE47-40025A	HOLDER-FUSE	KFSN-L-16,15A,NYLON#66,5G	1	●
M 43	3601-001034	FUSE-FERRULE	250V,10A,TIME-DELAY,CERAMIC,6	1	
M 44	DE91-40102B	ASSY NOISE FILTER	FPO-215L-1,250V,15A,CAPSULE-TY	1	
M 45	DE61-50435A	BRACKET-W/SENSOR-B	SECC,T1.0,W100,L100	1	●
M 46	DE91-70157B	ASSY-WEIGHT SENSOR	CO88R,RUSSIA,ASAHI	1	●
M 47	DE61-50489A	BRACKET-WAVE	SECC,T0.6,W49,L80,RE-CH1	1	●
M 48	DE61-70132A	SPRING-ARM	1.6,12.9,58.8,14.5,RE-CH1	2	●
M 49	DE92-90459A	ASSY-BKT H/SLIDER(L)	RE-CH1	1	●
M 50	DE80-10105B	BASE-PLATE	SGCC1-Z,T0.8,W496,L342	1	●

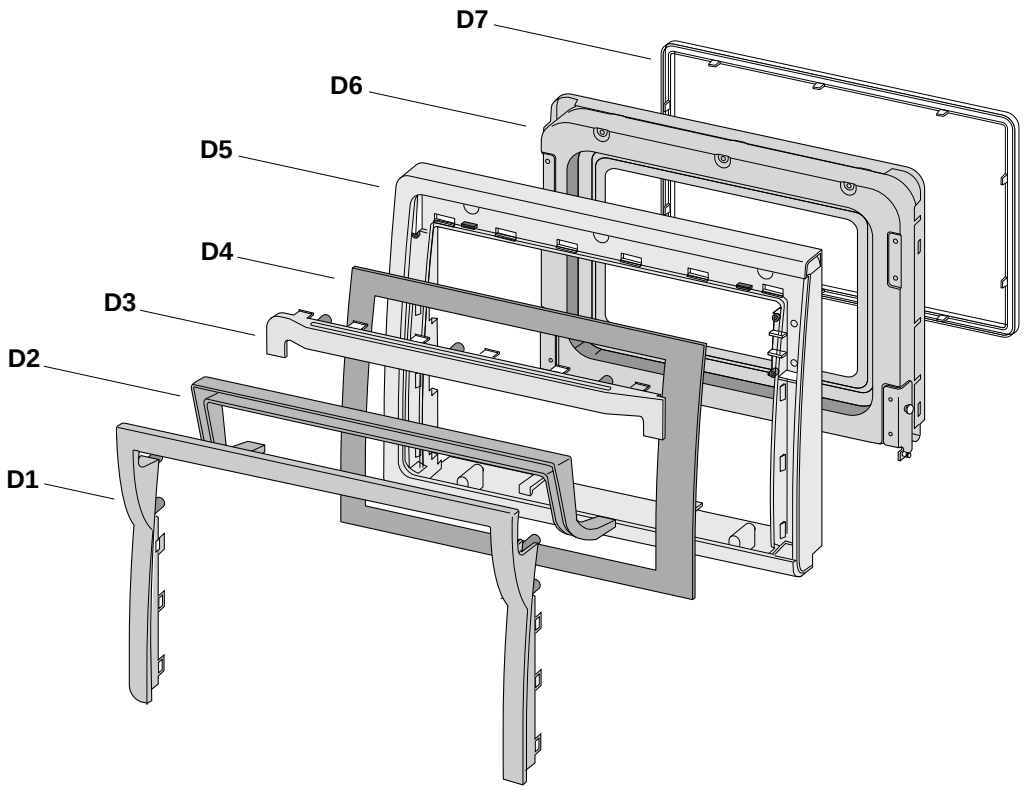
● : Option Parts ⚠ : Warning ⚠ :Electrostatically Sensitive Devices

8-2 Main Parts List

Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
M 51	DE92-90458A	ASSY-BKT H/SLIDER(R)	RE-CH1	1	●
M 52	DE64-90131C	DECORATION-FOOT	PC(LEXAN141),L436,G66,D/GRAY,R	1	
M 53	DE39-20058F	ASSY POWER CORD	KKP-4819D/B232,230V/16A,L1700	1	
M 54	DE26-20158A	TRANS-L.V	SLV-CHE,230V,50HZ,AC19/7/2.45V	1	
M 55	DE31-10166B	MOTOR-FAN	SMF-CH1EA,230/50HZ,2100RPM,MIN	1	
M 56	DE61-30181A	SUPPORTER-MGT	SECC,T0.8,W20,L335	1	
M 57	DE61-40062A	FOOT	PC(LEXAN141),D/GRAY,G9.25,RE-C	2	●
M 58	DE63-90183A	CUSHION-HVT	NEOPRENE-RUBBER,T8.5,W33,D33,H	1	●
M 59	DE62-90100A	ADIABATIC-LEFT	SUPER-FINE-INSULATIO,5,W314,D2	1	●
M 60	DE71-60430A	COVER-ADIABATIC	STS,PI0.5,W316.2,L265.3,MESHME	1	●
M 61	DE61-50502A	BRACKET-WAVE(M)	SECC,T0.6,W30,L30,RE-CH1	1	●
M 62	DE65-20009A	CABLE CLAMP	DA-100,WHT	1	
M 63	DE63-90007A	CUSHION-RUBBER	CR,T4,W10,L40	2	
M 64	DE93-90038A	ASSY-B/RESISTOR	FX175Z-D	1	●

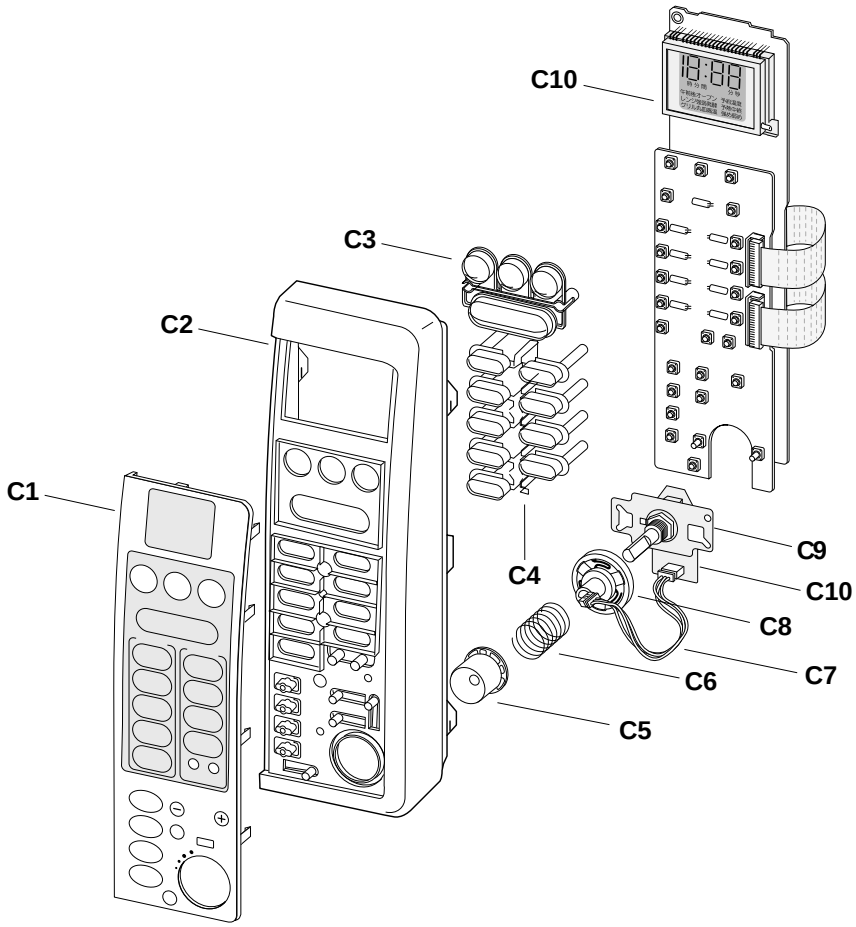
● : Option Parts ⚠ : Warning ⚠ :Electrostatically Sensitive Devices

8-3 Door Parts List



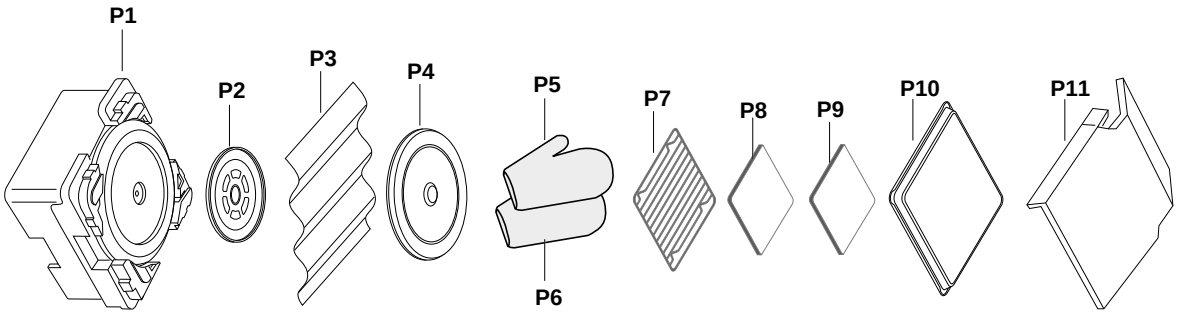
Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
D 1	DE64-20113A	HANDLE	PC(LEXAN141),BLK,85G,RE-CH1	1	●
D 2	DE64-20114A	HANDLE-COVER	PC(LEXAN141),BLK,50G,RE-CH1	1	●
D 3	DE64-20115A	HANDLE-SASH	PC	1	●
D 4	DE67-20162A	SCREEN-DOOR(B)	GLASS(TEMP),T4,W243,L359,BLK,R	1	● ⚠
D 5	DE64-40267A	DOOR-A	PC,T3,W290,L409.5	1	●
D 6	DE92-50129C	ASSY DOOR-E	SELANT,BLK,RE-CH1	1	●
D 7	DE64-40266A	DOOR-C	PBT,1.5,W260,L376	1	●

8-4 Control Parts List



Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
C 1	DE71-60369B	COVER-PANEL	ABS,T3,W72,L260,90,RUSSIA	1	●
C 2	DE72-70172A	CONTROL-PANEL	PC,140,DARKGRAY,3,88,290	1	●
C 3	DE66-20181A	BUTTON-SELECT-B	ABS,NTR	1	●
C 4	DE66-20180A	BUTTON-SELECT-A	ABS,NTR	1	●
C 5	DE64-10125A	KNOB	PC,D/GRAY	1	●
C 6	DE61-70129A	SPRING-KNOB	0.6,21.4,46.9,22.6,RE-CH1	1	●
C 7	DE39-40113B	WIRE HARNESS-F	100V,50/60HZ,RE-CH1	1	●
C 8	DE64-10126A	KNOB-HOLDER	POM,NTR	1	●
C 9	DE61-50448A	BRACKET-VOLUME	SECC,T0.8,W56.6,L30	1	●
C 10	DE91-10480A	ASSY PCB-MAIN	AC230V/50HZ,SENSOR,VFD	1	● ⚠

8-5 Control Parts List



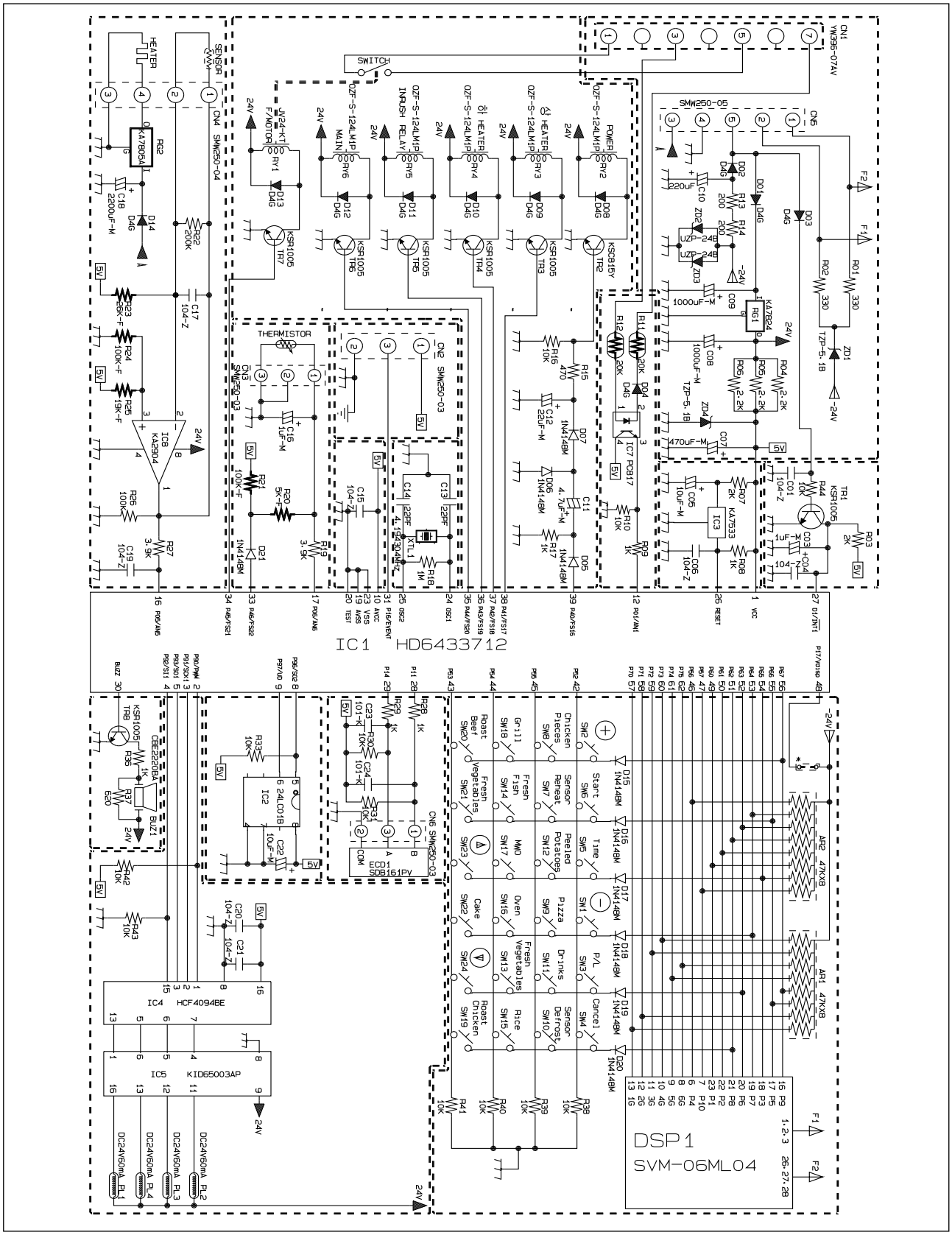
Ref. No.	Parts No.	Description	Specification	Q'ty	Remarks
P1	DE69-20277A	CUSHION-TRAY;	EPS50RE-CH1	1	●
P2	DE92-90461B	ASSY TRAY SUB	CO88R	1	●
P3	DE63-90164A	CUSHION-DOOR	LAMI-SHEET	1	●
P4	DE74-20103B	TRAY-CERAMIC	CERAMIC T.3.8	1	●
P5	DE63-90170A	GLOVE-OVEN	PS/WOOL	1	●
P6	DE63-90170B	GLOVE-OVEN	PS/WOOL LEFT	1	●
P7	DE74-70072A	PACK-WIRE	MSWR10 PI3.5	1	●
P8	DE68-60919A	MANUAL-COOK BOOK	PAPER CIS	1	●
P9	DE68-62316A	MANUAL-INSTRUCTIION	PAPER CIS	1	●
P10	DE74-20104A	TRAY-CONVECTION	SPP T0.8	1	●
P11	DE69-80155A	PAD-TRAY	SW2 B	1	●

8-6 Standard Parts List

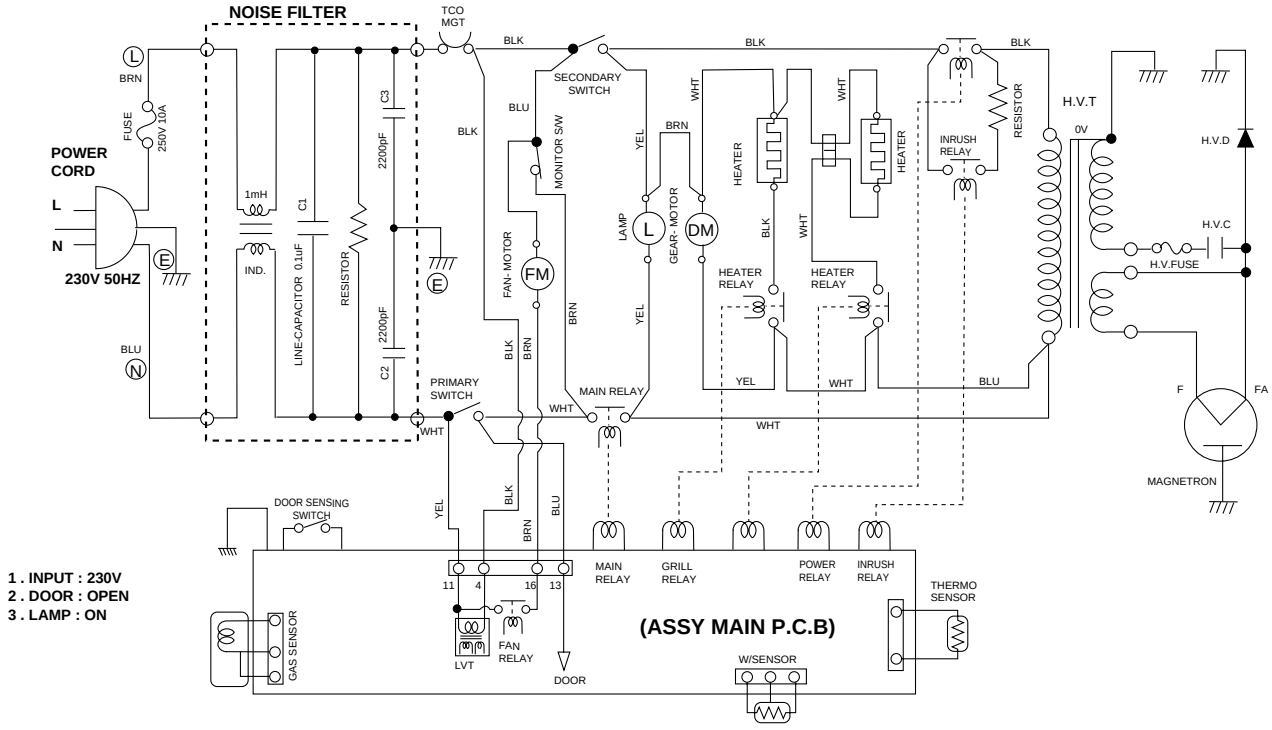
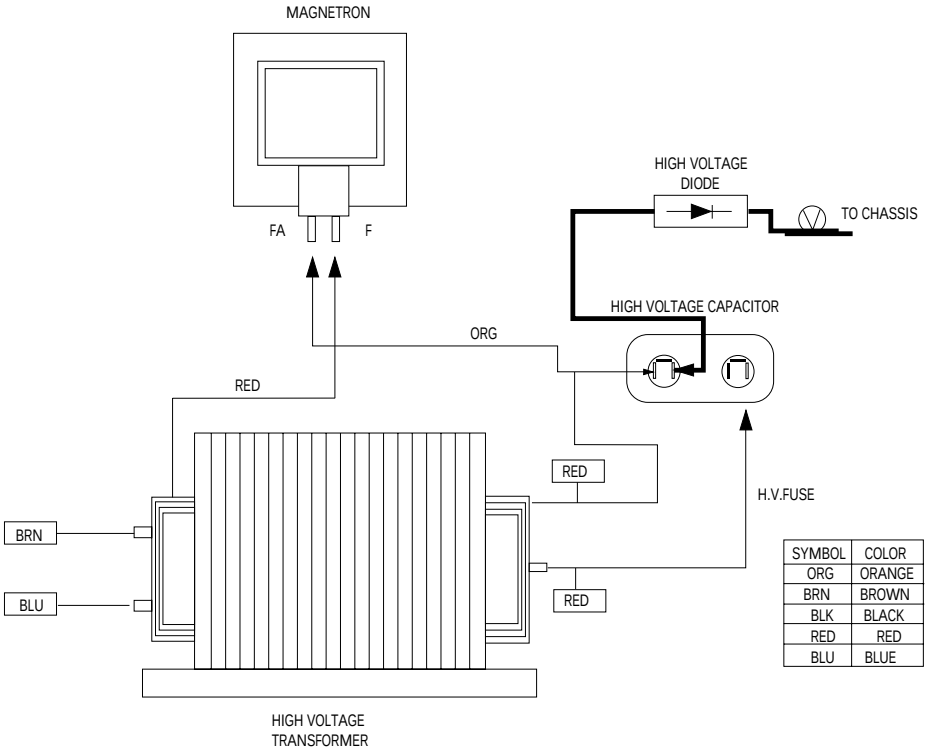
Parts No.	Description	Specification	Q'ty	Remarks
DE60-10012A	SCREW-TAP TITE	TH,+,3,M4,L10,SWR10,ZPC2,TOOTH	2	BA+F/M
DE60-10052A	SCREW-TAP PH	PH,M4,L8,FEFZY	10	DO+D/E
DE60-10053B	SCREW-TAP	PH,M4,L10,FEFZY	3	B-W/SE
DE60-10053B	SCREW-TAP	PH,M4,L10,FEFZY	3	BA+C/F
DE60-10053B	SCREW-TAP	PH,M4,L10,FEFZY	4	DO+HAN
DE60-10053B	SCREW-TAP	PH,M4,L10,FEFZY	4	W/SENS
DE60-10069A	SCREW-TAP TH	TH,M4,L10,FRFZY	2	BA+C/B
DE60-10069A	SCREW-TAP TH	TH,M4,L10,FRFZY	2	BK-W/H
DE60-10069A	SCREW-TAP TH	TH,M4,L10,FRFZY	1	BK-O/C
DE60-10069A	SCREW-TAP TH	TH,M4,L10,FRFZY	5	C/BACK
DE60-10069A	SCREW-TAP TH	TH,M4,L10,FRFZY	2	HV+B/P
DE60-10069A	SCREW-TAP TH	TH,M4,L10,FRFZY	2	HV+C/B
DE60-10080A	SCREW-WASHER	M5,L12,2S	4	HVT
DE60-10080A	SCREW-WASHER	M5,L12,2S	4	MGT
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	2	BA+D/F
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	1	G/S
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	1	GA+C/U
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	5	HE+C/U
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	2	LATCH
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	2	P/HE-L
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	6	P/OUT
DE60-10082A	SCREW-A	M4,L12,2S,TOOTHED	5	S/MGT
DE60-10082J	SCREW-TAPPING	TH,2S-4X8,MSWR3,ZPC,YEL,WS	1	C/BOX
DE60-10088A	SCREW-TAP PH	PH,M3,L8,FEFZY,PLAIN	1	LAMP
DE60-10123A	SCREW-TAP TH	3-4X8,FE,FN	2	MICA
DE60-20014A	BOLT-FLANGE	M5,L10,MSWR3,FEFZY	4	BA+B/H
DE60-10086A	SCREW-TAP BH	BH,M3,L8,FEFZY	2	B/VOLU
DE60-10088A	SCREW-TAP PH	PH,M3,L8,FEFZY,PLAIN	15	
DE02-00027A	TAPE-OPP	W50,YEL	1	
DE60-10100A	SCREW-TAPPING	PH,3,L6,AB,FEFZY	1	RG1
DE60-20065A	BOLT-EARTH	M4,6,BS	1	

9. P.C.B Diagrams

9-1 P.C.B Diagrams



9-2 P.C.B Parts List

Parts No.	Description	Specification	Q'ty	Remarks
3406-000175	SWITCH-ROTARY	28V,10mA,DP36T,18.8mm	1	ECD1
3501-001015	RELAY-POWER	24V,21.8mA,16A,1FormA,20mS,10m	5	RY2~6
3501-001016	RELAY-MINIATURE	24V,12.5mA,5A,1FormA,8mS,4mS	1	RY1
3710-000132	CONNECTOR-SOCKET	12P,1R,2.5mm,STRAIGHT,SN	2	CN9,10
3711-000315	CONNECTOR-HEADER	1WALL,7P,1R,3.96mm,STRAIGHT,SN	1	CN1
4713-001042	LAMP-PILOT	24VDC,60ßÃ,1.5W,ORG,-,-,4.1x10	4	PL1~4
DE07-10087A	V.F.DISPLAY	SVM-06ML04,REDDISHORG/GRN,6G,4	1	VFD1
DE13-20016A	IC-VOLT REGU	KA7805A,TO-220AB,1A,0/125C	1	RG2
DE30-20016A	BUZZER	CBE2220BA,STICK	1	BUZ1
DE37-90020A	CONNECTOR ASSY	YJN25012,PLATE,73MM,WHT	2	CN7,8
DE61-90166A	HOLDER-DIGITRON	NYLON#66,T1.5,W86,L54.3	1	
DE62-30032A	HEAT SINK-S1	A6030,W15,L25.5	1	RG1
DE91-20528A	ASSY PCB AUTO-MAIN	AC230V/50HZ,CO88R	1	
0401-001002	DIODE-SWITCHING	1N4148M,100V,200mA,500mW,3nS,D	10	D05~07,15~21
0402-000559	DIODE-RECTIFIER	D4G,400V,1A,T-1	11	D01~04,08~14
0403-000387	DIODE-ZENER	UZP24B,24V,22.8-25.6V,1W,DO-41	2	ZD2,3
0501-000388	TR-SMALL SIGNAL	KSC815,NPN,400mW,TO-92,BK,120	1	TR2
0504-001014	TR-DIGITAL	KSR1005,NPN,300mW,4.7K-10K,TO	7	TR1,3~8
2001-000003	R-CARBON	330ohm,5%,1/8W,AA,TP,1.8x3.2mm	2	R01,02
2001-000004	R-CARBON	200Kohm,5%,1/8W,AA,TP,1.8x3.2m	1	R22
2001-000273	R-CARBON	100Kohm,5%,1/8W,AA,TP,1.8x3.2m	1	R26
2001-000290	R-CARBON	10Kohm,5%,1/8W,AA,TP,1.8x3.2mm	12	R10,16,30,31,33,38,39~44
2001-000429	R-CARBON	1Kohm,5%,1/8W,AA,TP,1.8x3.2mm	6	R08,09,17,28,29,36”
2001-000435	R-CARBON	1Mohm,5%,1/8W,AA,TP,1.8x3.2mm	1	R18
2001-000446	R-CARBON	2.2Kohm,5%,1/2W,AA,TP,3.3x9mm	3	R04~06
2001-000577	R-CARBON	2Kohm,5%,1/8W,AA,TP,1.8x3.2mm	2	R03,07
2001-000613	R-CARBON	3.9Kohm,5%,1/8W,AA,TP,1.8x3.2m	2	R19,27
2001-000780	R-CARBON	470ohm,5%,1/8W,AA,TP,1.8x3.2mm	1	R15
2001-000904	R-CARBON	620ohm,5%,1/8W,AA,TP,1.8x3.2mm	1	R37
2001-001102	R-CARBON(S)	200ohm,5%,1/2W,AA,TP,2.4x6.4mm	2	R13,14
2003-001000	R-METAL OXIDE	20Kohm,5%,2W,AA,TP,6x16mm	2	R11,12
2004-000195	R-METAL	100Kohm,1%,1/8W,AA,TP,1.8x3.2m	2	R21,24
2004-001118	R-METAL	5Kohm,1%,1/4W,AA,TP,2.4x6.4mm	1	R20
2004-001976	R-METAL	19Kohm,1%,1/8W,AA,TP,1.8x3.2mm	1	R25
2004-001977	R-METAL	26Kohm,1%,1/8W,AA,TP,1.8x3.2mm	1	R23
2202-000121	C-CERAMIC,MLC-AXIAL	100pF,10%,50V,Y5P,TP,1.9x3.5	2	C23,24
2202-000780	C-CERAMIC,MLC-AXIAL	100nF,+80-20%,50V,Y5V,TP,3.5x1	8	C01,04,06,15,17,19~21
2401-000037	C-AL	470uF,20%,16V,GP,TP,8x11.5mm,5	1	C07
2401-000180	C-AL	1000uF,20%,35V,GP,-,16x25x7.5m	1	C08
2401-000195	C-AL	1000uF,20%,50V,GP,TP,8x11.5,5	1	C09
2401-000466	C-AL	10uF,20%,35V,GP,TP,5x7,5	2	C05,22
2401-000598	C-AL	1uF,20%,50V,GP,TP,4x7,5	2	C03,16
2401-000686	C-AL	2200uF,20%,16V,GP,TP,13x25mm,5	1	C18
2401-000876	C-AL	220uF,20%,50V,GP,TP,13x20mm,5m	1	C10
2401-000914	C-AL	22uF,20%,16V,-,TP,5x11,5mm	1	C12
2401-001268	C-AL	4.7uF,20%,50V,GP,-,5x11mm,5mm	1	C11
2801-003214	CRYSTAL-UNIT	4.194304MHz,50ppm,28-AAA,12pF	1	XTL1
3404-000282	SWITCH-TACT	12Vdc,50mA,120+-30gf,6.2x3.6mm	22	SW1,3~24
3404-001039	SWITCH-TACT	15V,20mA,130gf,6x6x7mm,SPST	2	SW6,25
3711-000881	CONNECTOR-HEADER	BOX,3P,1R,2.5mm,STRAIGHT,SN	3	CN2,6,11
3711-000882	CONNECTOR-HEADER	BOX,3P,1R,2.50mm,STRAIGHT,SN	1	CN3
3711-000940	CONNECTOR-HEADER	BOX,4P,1R,2.5mm,STRAIGHT,SN	1	CN4
3711-000999	CONNECTOR-HEADER	BOX,5P,1R,2.50mm,STRAIGHT,SN	1	CN5 ⚠
DE09-30227A	IC-MCU	24LC01B/P,DIP,DIP,EEPROM	1	IC2 ⚠
DE13-20007A	IC-OP AMP	KA2904,DIP	1	IC8 ⚠
DE13-20009A	IC	KA7533,DIP	1	IC3 ⚠
DE13-20017A	IC-DRIVE	KID65003AP,DIP,16P,STICK,TR-AR”	1	IC5
DE39-60001A	WIRE-SO COPPER	PI0.6,SN,T,52MM,TAPING_WIRE	74	J01~74

10. Schematic Diagrams